



Defence Works Functional Standard
Safety Rules & Procedures 03

Petroleum





DEFENCE WORKS
SAFETY RULES & PROCEDURES

Petroleum

SRP 03

MOD safety rules and procedures for work on petroleum installations

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Amendments

Amendments	Page No	Date	Inserted By

Foreword

The Standard was prepared under the patronage of the Defence Fuels and Lubricants Distribution Committee.

The MOD Safety Rules and Procedures are mandatory for adoption by Commanding Officers, Chief Executives, and Heads of Establishments, into their site safety plans to aid the safe conduct of works activities on petroleum installations.

The document replaces Volume 8, Section 53 of the Department of Environment/Property Services Agency (DOE/PSA), Mechanical and Electrical Engineering Guide (MEG). It is a development of Volume 8, Section 53 of the MEG and uses the same technical foundation, and so those who are familiar with Volume 8, Section 53, can be expected to convert to the new document with ease.

The adoption of the document into the site safety plan will influence the conduct of various organisations and personnel including:

- Site Safety Officer
- Officer in Charge of the Petroleum Installations
- Establishment Works Consultant
- Works Services Management Organisation
- Works Services Management Contractors and Sub-Contractors
- Project Sponsor, Project Managers and Contractors for major projects
- Designers of installations
- Any organisation undertaking works on a fixed petroleum installation

The implementation of the document has training implications for the above organisations and personnel.

The fundamental approach to the management and control of work on petroleum installations is introduced in Section 1.3.

The Commanding officer, Chief Executive, or Head of Establishment of a base or unit which has bulk petroleum facilities is advised to circulate the MOD copies, as a minimum to:

- Officers who are in charge of the petroleum installations
- Property Managers
- Site Safety Officer

When adopted by a particular base, site or unit, it is recommended that the Standard is cited in all project briefs and all contracts for petroleum works on that base.

The MOD Safety Rules and Procedures on Petroleum Installations are for work on:

- Bulk fuel installations, including those holding aviation fuel, naval fuel and fuel for boiler and power generation.
- Motor transport filling stations other than for routine pump servicing which is covered for by a separate document
- Work on fixed fuel handling equipment and pipelines
- Decommissioning and demolition of fuel facilities

The MOD Safety Rules and Procedures do not apply to small domestic heating fuel storage, provided that work which creates petroleum risks (such as hot work) or confined space entry, is not undertaken.

Technical advice and assistance on MOD petroleum related matters can be obtained from Defence Estate Organisation (Works) through local offices or directly from:

Head of Bulk Petroleum Installations
Airfield and Bulk Fuels Group
Defence Estate Organisation (Works)
St George's Barracks
Blakemore Drive
Sutton Coldfield
West Midlands
B75 7QB

Tel: (0121) 311 2160
Fax: (0121) 311 3636

Amendments to the document will be advised by DEO(W) Technical bulletin, issued to the Property Manager and HQ Works Staff. It is the responsibility of the user to check with the Property Manager or Project Sponsor to ascertain if amendments have been issued.

Guidance on use of the document is provided in the following section entitled Document Format.

This Standard has been devised for the use of the Crown and of its contractors in the execution of contracts for the Crown. The Crown hereby excludes all liability (other than liability for death or personal injury) whatsoever and howsoever arising (including, but without limitation, negligence on the part of Crown its servants or agents) for any loss or damage however caused where the Standard is used for any other purpose.

Document format

The MOD Safety Rules and Procedures are presented in twelve sections with twelve supporting appendices.

The contents are listed to three levels, namely the section heading, the main topic heading, and the third level of sub-heading.

References cited in the text are listed in Appendix 11.

The definitions of terms used in the document are contained in Appendix 12.

The sections can be considered to be grouped as follows:

- Section 1 is a general introduction to the document and includes a broad executive overview of the need for safe working systems, and the key points of the MOD system.
- Section 2 contains guidance on the roles of the Authorised Personnel who implement the safe working systems, including their duties, qualifications and appointment criteria. Section 3 contains similar information on the appointment, qualification and duties of the Person in Charge of works in a petroleum hazardous area. The relationship between the Authorised Person Petroleum and the Person in Charge is explained in Section 4.
- Section 5 comprises a description of the permits for the control of work.
- The main body of the MOD Safety Rules and Procedures is Section 6. In addition to the safety rules, guidance notes are provided in italics. Section 7 covers the commissioning of new installations.
- Supporting Sections 8 to 12, in which medical requirements, safety training, safety equipment, notices, and records, are presented.

Appendices are used extensively, to include permits, documentation, extracts from other MOD standards, and additional specialised guidance on a wide range of directly related works petroleum matters.

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Section 1 Introduction

1.1 SCOPE AND APPLICATION

These Ministry of Defence (MOD) Safety Rules and Procedures comprise a safe system for the organisation of work on petroleum installations on the MOD Estate, are mandatory, and represent the minimum requirement. They were prepared with the aim of providing a system for adoption by the Commanding Officer, Head of Establishment, or Officer in Charge which, when applied, will facilitate the discharge of responsibilities under, and secure compliance with, the Health and Safety at Work Act (Reference 1) and the Management of Health and Safety (Reference 2). The responsibilities of the Commanding Officer, Head of Establishment, or Officer in Charge for the health and safety of all personnel on base, are recognised, and systems and procedures are presented accordingly.

The MOD Safety Rules and Procedures apply to a wide range of permanent, fixed petroleum installations which differ in terms of type, capacity, complexity, and in the classes of petroleum product handled. These installation types include Bulk Fuel Installations, Oil Fuel Depots, Motor Transport Filling Stations and storage facilities associated with heating and power generation plants. They do not apply directly to small domestic heating and similar installations.

It is recommended that the MOD Safety Rules and Procedures be adopted by the Commanding Officer, Head of Establishment or Officer in Charge, as part of the safety plan for the establishment. This action will assist in the discharge of safety responsibilities, and in particular, those in respect of contractors working in petroleum hazardous areas.

The application of the MOD Safety Rules and Procedures is principally by the Works Services Management organisation in the control of works. Authority for works on a petroleum installation is given by the line manager, known as the Operating Authority, who has delegated authority for the installation.

Where the possibility exists for the tasking of more than one works organisation at a particular site or installation, a planned approach for co-ordination and co-operation of all parties is necessary, with the line manager as the focal point for the co-ordination works.

1.2 BACKGROUND

These MOD Safety Rules and Procedures are based on the well proven safety practices embodied in the Department of the Environment / Property Services Agency Mechanical and Electrical Engineering Guide, Section 53, which was adopted by the MOD on the untying from Property Services Agency. They are updated to meet the current technical and organisational requirements for works on petroleum installations on the MOD Estate. The MOD Safety Rules and

Procedures use the practice of the appointment of Authorising Engineers to select and monitor Authorised Persons, who are trained and appointed with the purpose of ensuring safe working practice for works on petroleum installations. In any circumstance where more than one Authorising Engineer or Authorised Person is appointed, one of those appointed should be nominated to co-ordinate all activities to ensure that the safety objectives are met.

The following aspects of the Mechanical and Electrical Engineering Guide Section 53 have been updated:

- The Permit to Work procedures to include Operating Authority permission for permits to be raised
- The procedures for the appointment of the Authorising Engineer Petroleum and the Authorised Person Petroleum
- The duties of the Authorising Engineer Petroleum and the Authorised Person Petroleum
- The co-ordination of works at Product Receipt Enclosures
- Co-ordination of electrical work

1.3 THE MANAGEMENT OF THE WORK HAZARDS OF PETROLEUM

This section provides an introduction to the fundamental approach to the management and control of work, as implemented by the MOD Safety Rules and Procedures. The approach presented illustrates the principles of control, and the details presented in this introductory section are of a simplified form. All work control in practice must be based on the main body of the document.

1.3.1 Installations and Petroleum Hazards

A typical MOD petroleum installation can include a combination of the following features:

- Storage tanks
- Receipt pipelines
- Dispense points to road vehicles
- Dispense via pipeline or hydrant system
- Pump house
- Filter water separators and fuel monitors
- Roads and vehicle hardstanding
- Control room
- Drainage system including secondary containment and oil separators
- Valve pits

A wide range of tasks is possible from a visual inspection through to tank entry and repair requiring the use of hot working methods. The essential criteria which are used to judge if the work requires to be controlled by permit are the risk of:

- Fire or explosion

- Asphyxiation
- Poisoning

Tasks such as the visual inspection of the facilities which do not require the use of tools, can be completed without the issue of a permit to work. If the maintenance task represents a low risk, and the installation can remain operational when the work is implemented, a Permit to Work Petroleum Hazardous Area is issued. This provides the means of controlling the work to the permitted task, and limiting the work practices to those which, for example, do not create an ignition risk at an installation which is being operated.

Examples of work controlled by a Permit to Work Petroleum Hazardous Area are:

- External painting of tanks or equipment
- Connection or disconnection of service hoses at dispense points
- Minor adjustment or replacement of instruments

If there is an increased risk of fire or explosion due to the potential release of petroleum liquid or vapour, the introduction of sources of ignition to the hazardous area, or personnel are required to enter tanks or confined spaces, or face risks of exposure to leaded vapour or sludge, then petroleum operations are to cease, and a Restricted Area is to be set up. Examples of Restricted Area work are:

- Opening plant and equipment for maintenance, thus exposing petroleum product
- Gas freeing tanks prior to inspection and other work
- Tank entry for inspection or work
- When hot work is required
- When any leaded equipment, sludge or waste, is handled or exposed
- Excavation work where there is a risk of petroleum liquid or vapour within the ground

All work on petroleum installations will be co-ordinated by the Authorised Person Petroleum to ensure that the petroleum related risks are fully taken into account

At the planning stage for each work task, the Authorised Person Petroleum prepares a risk assessment, and as a result, identifies whether a Permit to Work Petroleum Hazardous Area is required or if there is a need to set up a Restricted Area.

1.3.2 Risk Assessment and Job Planning

It is essential that all work be planned. The primary assessment of the petroleum hazards must be made drawing on the details of the MOD Safety Rules and Procedures. The output is the decision on whether a Restricted Area is required.

The risk assessment can have three related elements which are developed in parallel with the planning of the work.

- The preparation of detailed job plans and method statements, such as the identification of the isolation methods required before tank entry

- The identification of general maintenance work risks, including hazards other than those which are petroleum related
- Identification of any circumstances which appear to limit the full application of the MOD Safety Rules and Procedures, which will require guidance from the Authorising Engineer

For all tasks, the risk assessment should be noted in the Authorised Person Petroleum diary and supporting papers filed on the job and planning file.

When a Restricted Area is required, the Authorised Person Petroleum will assess the stages which segregate the job into different levels of petroleum or confined space entry related risk. Permits are subsequently raised for these different stages.

Other planning action includes the definition of the condition of the installation which is required immediately before the work can commence, for example, whether tanks are to be emptied.

It is recommended that the Safety Plan be prepared, using a form as shown in Appendix 4, to record the key decisions. For Restricted Areas, the condition of the facility prior to work, and the stages of the job (hence the raising of permits), should be defined.

The Permit to Work Petroleum Restricted Area guides the Authorised Person Petroleum in the use of the MOD Safety Rules and Procedures for the high risk aspects of the work. The permit includes requests for confirmation of isolation, the nomination of the combustible gas limits, and the type of Personal Protective Equipment applicable.

1.3.3 Work Authorisation, Control and Permits

The key personnel in the routine management and control of works on petroleum installations are:

- The Line Manager of the installation (Operating Authority)
- The Authorised Person Petroleum
- The Person in Charge of the works

The primary assessment by the Authorised Person Petroleum enables him to decide on the type of permit to work required. There will be communication with the Operating Authority at the job planning stage, to ascertain when the work can be undertaken.

There will subsequently be formal communications between the Authorised Person Petroleum and the Operating Authority:

- For work which will be controlled by a Permit to Work Petroleum Hazardous Area, the Authorised Person Petroleum prepares a Notification List for a series of such work tasks. When the Operating Authority has given authority, the Authorised Person Petroleum can then implement the work, including raising the permits to work
- If a Restricted Area is required, the Authorised Person Petroleum prepares a form entitled Operating Authority Authorisation for Restricted Area Permits to be Raised. The Restricted Area cannot be set up unless the authority is given. The Operating Authority must also make any

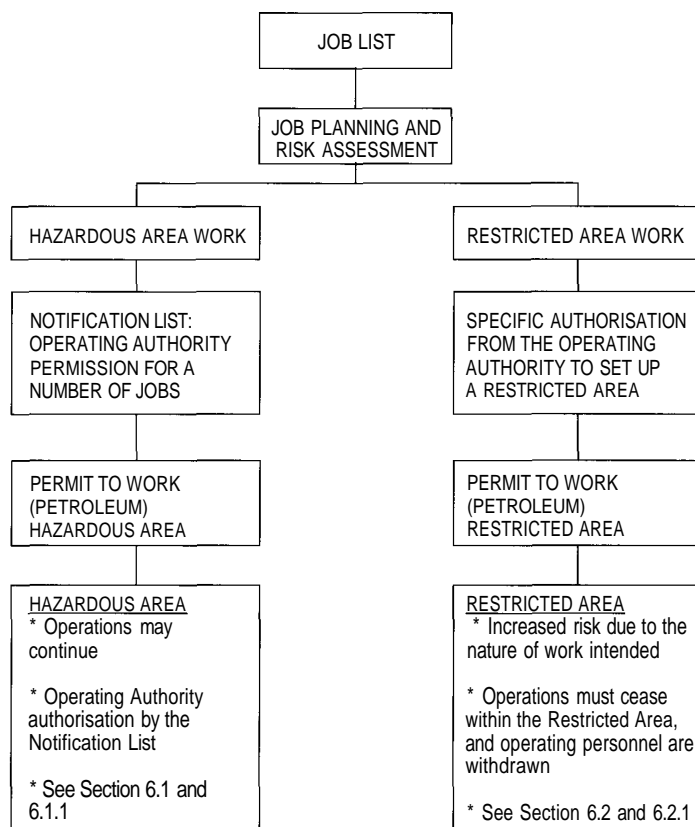
necessary arrangements to ensure that the installation is in the condition required for work to be implemented, that operations cease, and operating staff are withdrawn prior to work starting. The issue and control of the Permit to Work Petroleum Restricted Area is then the responsibility of the Authorised Person Petroleum

A flow chart showing planning, risk assessment and the authority for permits and the control of works is shown at Figure 1.1

The Line Manager (Operating Authority) has the authority delegated by the Commanding Officer, Head of Establishment or Officer in Charge for one or a number of petroleum installations. The Operating Authority is required to exercise duty of care over all activities at the installations, including maintenance.

Control is exercised by the Operating Authority by giving formal approval to the Authorised Person Petroleum for the conduct of maintenance work in accordance with the MOD Safety Rules and Procedures for Work on Petroleum Installations. The Authorised Person Petroleum provides the specific petroleum works and trade expertise. Control and co-ordination by the Operating Authority is required over current and planned works. It is recommended that the documents authorising works are displayed at the petroleum operations office or control centre.

Figure 1.1 Flow chart— Planning and control of work



The implementation of a major task which requires a Restricted Area can need a series of permits to be raised consecutively by the Authorised Person Petroleum. When the overall works task is complete, petroleum operations can be restored.

A simplified example of the co-ordination of works activities is provided in Appendix 4. There may be circumstances when the works tasks are planned by an organisation other than the Works Services Manager. In such circumstances, the planned approach to the co-ordination of works introduced in Section 1.1 applies, and the Authorised Person Petroleum may be a Service, MOD, or contractor's employee, rather than the Works Services Manager.

The Operating Authority can use the information provided by the Authorised Person Petroleum, to link to the system in place for the establishment wide control and co-ordination of operations and works activities. In this way establishment wide safety issues can be taken into account, together with local operational matters at the petroleum installation, before permission is given to the Authorised Person Petroleum to initiate the works.

The expectation is that with good work planning and consultation, the permission will be granted to the Authorised Person Petroleum to proceed with the works at the planned time.

1.4 OVERSEAS REQUIREMENTS

At overseas locations the MOD Safety Rules and Procedures are to be applied as far as is practicable. In case of conflict between MOD Safety Rules and Procedures, and local legally enforceable overseas regulations, the latter are to be complied with provided they are additional to or more stringent than the MOD Safety Rules and Procedures.

1.5 LIMITS OF APPLICATION

The MOD Safety Rules and Procedures are of general application and cover a very high percentage of the situations encountered on works on petroleum installations on the MOD Estate. However, with such a wide range of installations of differing age, designs and complexity, there will be situations which will require individual hazard assessment and treatment. The Authorising Engineer is to be consulted by the Authorised Person, when the MOD Safety Rules and Procedures cannot be directly applied. The Authorising Engineer must make an assessment of the risk and determine a course of action which assures the appropriate level of safety. The risk assessment and the course of action must be documented, and an information copy forwarded to the Defence Estate Organisation (Works) Technical Authority to assist in the development of the MOD Safety Rules and Procedures, and the training of Authorised Persons. Where the Authorising Engineer has doubt concerning safe working due to such a risk assessment, the Defence Estate Organisation (Works) Technical Authority should be contacted for guidance.

The MOD Safety Rules and Procedures are prepared with due regard to the requirements and recommendations of:

- General and specific legislation relevant to the health and safety hazards associated with the storage and handling of petroleum in bulk
- Relevant publications of the Institute of Petroleum
- Advisory publications of the Associated Octel Company relevant to the cleaning of leaded gasoline tanks

As indicated in the title, the MOD Safety Rules and Procedures apply only to the execution of work on petroleum installations. They do not guide the operation of petroleum installations. The requirement for safety in maintenance is of significance to the designer of petroleum installations, as designs must satisfy such requirements.

The MOD Safety Rules and Procedures cover only those hazards which arise in works as a direct result of the presence of petroleum products in the installation. General safety matters are not covered.

The contact point for the Defence Estate Organisation (Works) Technical Authority is advised in the Foreword.

Section 2 Authorised personnel

2.1 ROLES OF THE AUTHORISING ENGINEER PETROLEUM AND THE AUTHORISED PERSON PETROLEUM

The Authorising Engineer Petroleum is responsible for the application and monitoring of the MOD Safety Rules and Procedures within the area for which he/she has been appointed. The duty Authorised Person Petroleum is responsible for the practical implementation and operation of the MOD Safety Rules and Procedures for the systems and installations for which he/she is appointed.

2.2 APPOINTMENT OF THE AUTHORISING ENGINEER PETROLEUM

2.2.1 Criteria

The Authorising Engineer Petroleum shall:

- Be a Chartered Engineer
- Have a minimum of five years relevant professional experience
- Have completed an MOD approved Authorised Person Petroleum course and obtained a satisfactory mark
- Have completed an MOD approved Authorising Engineer course
- Be familiar with the different types of equipment, installations and systems in use on the MOD Estate
- Become familiar with the more complex systems on the sites for which he/she is responsible

Note: that the requirement for a Chartered Engineer may be waived in exceptional circumstances for nominees with a sound technical background and with proven and substantial relevant experience in the type of installations over which works supervision will be exercised.

There may be circumstances when an Authorising Engineer is appointed to coordinate the activities of other Authorising Engineers on site. The above appointment criteria apply, plus demonstrable experience as an Authorising Engineer.

2.2.2 Appointment Process

The Authorising Engineer Petroleum is usually an employee of the Works Services Manager, and is nominated to the Commanding Officer, Head of Establishment or Officer in Charge for appointment. The nominee also may be a consultant to the Works Services Management organisation, an MOD civilian, or

from the Armed Forces. The appointment, which is normally for three years, is approved by the Commanding Officer, Head of Establishment, or Officer in Charge, following an assessment of the nominee's qualifications and experience against the criteria in paragraph 2.2.1. Defence Estate Organisation (Works) will, if requested, conduct this assessment on behalf of the Commanding Officer, Head of Establishment or Officer in Charge. The appointment of the Authorising Engineer Petroleum, and his acceptance are to be in writing in a manner similar to that shown in Appendix 1. The appointment will be subject to suspension if the Health and Safety conduct is not to the standard required by the Commanding Officer, Head of Establishment or Officer in Charge.

2.2.3 Duties of the Authorising Engineer Petroleum

The duties are:

- To recommend to the Commanding Officer, Head of Establishment or Officer in Charge, appropriately qualified personnel for appointment as Authorised Person Petroleum. The potential Authorised Person Petroleum must meet the training and experience criteria of the MOD Safety Rules and Procedures, and only those who are competent, medically fit and capable of performing the duties required of them will be appointed. Those appointed who have not met the medical requirements of certain types of work must be appointed only to duties which do not require medical clearance. (Typical forms of appointment are shown in Appendix 1)
- To maintain a register of all Authorised persons, and to audit their performance and record their operational experience every six months. The audit should pay particular attention to the operating and permit system records and should formally advise on any training or re-training that is required immediately, or before the next audit. Audit and training records are to be kept for at least six years and made available to the commanding officer or his nominee. An annual report is to be sent to the Commanding Officer and copied to the Defence Estate Organisation (Works) Technical Authority.
- To recommend to the Commanding Officer, Head of Establishment or Officer in Charge, the cancellation of any appointment as Authorised Person Petroleum and the withdrawal of the Certificate of Appointment
- To exercise a duty of care over the works which are implemented on the petroleum installations under his/her remit, to ensure that those undertaking designs and works are appropriately qualified to do so. Designs and works must be in accordance with the MOD standards and conducted in accordance with the MOD Safety Rules and Procedures
- To ensure that each Authorised Person Petroleum has adequate training and instruction in relation to any installation detailed on his Certificate of Appointment, and by means of refresher courses, that his training in works petroleum matters, First Aid and Fire Precautions is kept up to date
- To immediately investigate all dangerous occurrences at the petroleum installations for which he/she has works responsibility. The results of investigations are to be submitted to the Operating Authority, the Property Manager, and the Defence Estate Organisation (Works) Technical Authority.

- To ensure that all documents and records required by the MOD Safety Rules and Procedures, in particular the permits to work, are properly made and retained
- To ensure that adequate quantities of suitable safety equipment are readily available for work by Works Services Manager staff at the installations for which they are responsible
- To ensure that the medical clearance systems are in place and are operated
- To co-operate and communicate with Authorising Engineers of other disciplines as necessary to ensure that safe working procedures are implemented when the co-operation between trades is necessary

In case of doubt concerning the interpretation of the MOD Safety Rules and Procedures, the Defence Estate Organisation (Works) Technical Authority is be consulted by the Authorising Engineer Petroleum.

2.3 APPOINTMENT OF THE AUTHORISED PERSON (PETROLEUM)

2.3.1 Appointment

A potential Authorised Person Petroleum is nominated by the Authorising Engineer Petroleum to the Commanding Officer, Head of Establishment or Officer in Charge for appointment. The appointment will be made formally by the Commanding Officer, Head of Establishment or Officer in Charge to the Authorising Engineer Petroleum, and acknowledged in writing. A Certificate of Appointment will then be issued by the Authorising Engineer Petroleum to each Authorised Person Petroleum. An example is reproduced in Appendix 1.

The maximum validity of the Certificate of Appointment is three years. A Register of Certificates of Appointment is to be maintained by each Authorising Engineer Petroleum comprising all certificates, including those withdrawn. Copies of the Register are to be sent to the Works Services Manager and Property Manager responsible for maintenance of petroleum installations within the jurisdiction of the appropriate Authorising Engineer Petroleum. An officer appointed as an Authorised Person Petroleum for a particular Works Services Manager or Establishment is to relinquish his Certificate of Appointment and cease to be Authorised Person Petroleum when transferred from the establishment. The change must be noted in the Register of Certificates of Appointment Petroleum and the Commanding Officer, Head of Establishment or Officer in Charge informed.

2.3.2 Qualifications

An Authorised Person Petroleum must be:

- A trained mechanical technician, with a minimum qualification of ONC or equivalent, in an appropriate discipline
- Over twenty-one years of age
- Technically competent and familiar with the petroleum installation(s) for which he is authorised
- Have a full knowledge of the MOD Safety Rules and Procedures

- Have attended and successfully passed an MOD approved Authorised Person Petroleum training course
- Certified medically fit to carry out the duties for which he is authorised in accordance with the medical requirements of the MOD Safety Rules and Procedures
- Trained in medical first aid to the level of the short course as defined in the Health and Safety (First Aid) Regulations, 1981
- Trained in the use of the fire fighting equipment, and the action to be taken in emergency, at the petroleum installations for which he is authorised
- Made to understand that his continuing appointment depends upon the proper and thorough execution of his duties under the MOD Safety Rules and Procedures

2.3.3 DUTIES OF THE AUTHORISED PERSON PETROLEUM

The duties of the Authorised Person Petroleum for the installations for which he is authorised are:-

- To ensure as far as is reasonable and practicable that the requirements of the MOD Safety Rules and Procedures are fully observed by all works personnel including contractors, entering and working on petroleum installations
- At the planning stage of a works task, to identify the different levels of risk which apply to stages of the task, and plan to raise permits for the consecutive stages. Formally record the work plan, either on the job file or in the Authorised Person Petroleum diary. This planning action will require liaison with the engineer preparing designs for works to be undertaken in Hazardous and Restricted Areas, so that the safety requirements are fully taken into account at the earliest point of preparation
- To fully brief the Operating Authority in writing of the hazards and limitations created by the works, at, and external to, the installation, when a Restricted Area is to be set up. This briefing is at the planning stage of the works. Liaise with the Operating Authority to provide information on the limitations to those Service operations which could cause a hazard because of the works planned. Define the boundaries of the Restricted Area
- Obtain the permission of the Operating Authority to enter and carry out work at petroleum installations. Written permission is required before Hazardous and Restricted Area permits can be raised. For Restricted Areas, advise the Operating Authority when an area is de-restricted by returning the document on which permission was granted
- Ensure that all safety equipment for which he is responsible is inspected and maintained in good condition in accordance with Section 10 and that records of the checks are kept in accordance with Section 12. He must also ensure that equipment planned for use by contractors in a Restricted Area is suitable

- Conduct risk assessments, and carry out all the checks and tasks assigned to him by the MOD Safety Rules and Procedures, for the issue and withdrawal of Permit to Work Petroleum, combustible gas and oxygen percentage tests, and ensure that the conditions of the Permit to Work Petroleum are complied with
- To withdraw Permit to Work Petroleum if the environment, plant or safety equipment falls short of the safety standards required by the MOD Safety Rules and Procedures, the conditions under which it was issued change, Works Services Manager personnel or contractors employed by the Works Services Manager disregard these Rules and Procedures, or there is any failure of safety equipment. This would apply if, in an emergency, the Operating Authority carried out a contingent operation near the Restricted Area which could create a hazard inside the Restricted Area
- Complete the work permits including the Class of petroleum handled, or previously handled at the installation covered by the Permit to Work Petroleum, and define whether the products were leaded and/or toxic, to ensure that the correct safety procedures appropriate to the petroleum product handled are employed
- Should there be any doubts concerning the nature of petroleum product previously handled or stored, the Authorised Person Petroleum must obtain a statement in writing, detailing the products previously held in the installation and whether any tank contains, or has contained, leaded products
- Inform the Operating Authority verbally, and then in writing, of any defects in plant or equipment that he observes in the course of his normal duties
- The Authorised Person Petroleum must become familiar with the site spillage plan. He is responsible for ensuring that spillage caused by maintenance action, or equipment failures at installations for which he has maintenance responsibility, are cleaned up using the safe working methods of the MOD Safety Rules and Procedures
- Examine and sign maintenance log books periodically to ensure that all necessary action has been taken
- Ensure that the records required by the MOD Safety Rules and Procedures are properly kept, and monitor the status of the installation drawings, advising the Property Manager of deficiencies
- Ensure that all arisings from tank cleaning are handled and disposed of in accordance with requirements of the Operating Authority and in accordance with the current legislation for the disposal of hazardous waste
- Ensure that personnel, including contractors, required to wear breathing apparatus to enter tanks have evidence of medical clearance for such work

An Authorised Person Petroleum cannot wear breathing apparatus unless he is medically cleared and trained to do so.

Section 3 Person in Charge

3.1 INTRODUCTION

The person who accepts the permit to work from the Authorised Person Petroleum, and signs the permit accordingly, is the person in immediate charge of the operation. He is responsible for ensuring that the MOD Safety Rules and Procedures are adhered to, and that only the work authorised on the permit is allowed to take place.

The level of knowledge of petroleum hazards and safety systems demanded of the Person in Charge for works at petroleum installations depends on the nature of the tasks to be undertaken. To simplify matters, two broad categories of Person in Charge have been identified. The first requires a full understanding of the MOD Safety Rules and Procedures as applicable to the task, the second a knowledge of Section 6.1.

For example, the Person in Charge for a tank entry task must be highly familiar with, and trained in the hazards of petroleum and of confined space entry. This can be accomplished either by attendance on an MOD approved course or industry equivalent course combined with experience and specific training on equipment and processes to be used. The resultant competence should enable the MOD Safety Rules and Procedures to be rapidly assimilated.

When petroleum product is to be exposed, hot or cold work to be performed, or when tank entry is required, a Restricted Area is to be set up, and a Permit to Work Petroleum Restricted Area is raised. The Person in Charge of Restricted Area works must have a full understanding of the MOD Safety Rules and Procedures as applicable to the task.

For a task in the Hazardous Area which does not release petroleum or expose personnel to petroleum product, or involve hot or cold work, the level of knowledge required is less than for tank entry, and is covered in Section 6.1. For such works, a Permit to Work Petroleum Hazardous Area is raised.

Two categories of Person in Charge are assigned in accordance with the type of permit. The Person in Charge Restricted Area takes charge of the work defined within a Permit to Work Petroleum Restricted Area. Such work invariably presents high risks, and a full understanding of the MOD Safety Rules and Procedures as applicable to the work in hand, is a necessary qualification for the Person in Charge.

Works for which a Permit to Work Petroleum Hazardous Area Permit is raised can be completed by a Person in Charge who is familiar with those aspects of the MOD Safety Rules and Procedures which apply to such permits, rather than the full rules as applied to Restricted Areas.

3.2 PERSON IN CHARGE—RESTRICTED AREA WORK

3.2.1 Appointment

The person is designated to be in charge of the work and is named by the Authorised Person Petroleum on the Permit to Work Petroleum for the Restricted Area.

3.2.2 Qualifications

The Person in Charge must have the following qualifications:-

- Must be competent to carry out the type of work required in the Permit to Work Petroleum Restricted Area. In addition, he must be capable of preparing risk assessments for the work in relation to the conditions in which it is to be conducted
- Must be fully conversant with the requirements of the MOD Safety Rules and Procedures applicable to the work in hand and have the necessary specialised experience to ensure the safety of the petroleum installations concerned and all persons in his charge
- Must be medically fit to carry out the work required of him in the Permit to Work Petroleum, and have sufficient knowledge of medical first aid and resuscitation to be able to deal with an emergency situation pending medical assistance
- If the task includes hazards other than those associated with the handling of petroleum products, e.g. internal spray painting of tanks, he must be fully conversant with such additional hazards, have assessed the associated risks, and be competent to ensure that the risks are eliminated by additional safety precautions
- When the Person in Charge is a contractor's employee, it will be a contractual obligation that he has the above qualifications

3.2.3 Duties

The duties of the Person in Charge are as follows:-

- To ensure that the only work carried out is that for which he has received instructions. He must do so in strict conformity with the MOD Safety Rules and Procedures and any other safety requirements which are necessary for the safe conduct of the work
- When required by the MOD Safety Rules and Procedures, he must carry out all required checks with the Authorised Person Petroleum before a Permit to Work Petroleum is issued in accordance with the procedures described in Section 5
- To be in possession of a Permit to Work Petroleum, properly completed and signed, and be fully conversant, and able to ensure compliance, with the conditions set out in the Permit to Work
- To carry out gas concentration tests and oxygen percentage tests, as required by the MOD Safety Rules and Procedures, and ensure that work proceeds only when the readings are within the limits prescribed
- To ensure that all the conditions of the Permit to Work Petroleum are fully complied with by the personnel he is supervising and by all personnel entering a Restricted Area

- To ensure that all safety equipment required to enable the work to be carried out complies with the MOD Safety Rules and Procedures, is in good working order, and that no unsafe vehicles, equipment, tools or plant are brought into the Restricted Area
- To stop work and withdraw all personnel, tools, plant and equipment if for any reason the conditions of the Permit to Work Petroleum cannot be met, e.g. gas concentration is higher than stipulated, or there is a failure of ventilation arrangements. Withdrawal of tools and personnel will be necessary in the event of an electrical storm. When withdrawal is necessary, the Person in Charge must immediately inform the Authorised Person Petroleum verbally, and then in writing, of the action he has taken
- If a contractor's employee, he must ensure that he and the men under his control are adequately trained, and are medically fit to carry out the work required, and this shall be a contractual obligation. He must be able to provide evidence of the fitness of the personnel under his control

3.3 PERSON IN CHARGE—HAZARDOUS AREA WORK

3.3.1 Appointment

The person is designated to be in charge of the work, and named by the Authorised Person Petroleum on the Permit to Work Petroleum for the Hazardous Area.

3.3.2 Qualifications

The Person in Charge must be:

- Fully familiar with the requirements for the conduct of works in Hazardous Areas, as defined and expressed in Section 6.1 of the MOD Safety Rules and Procedures
- Able to demonstrate his knowledge of the pertinent aspects of the MOD Safety Rules and Procedures, by satisfactorily completing a questionnaire administered by the Authorised Person Petroleum before being issued with a Permit to Work Petroleum. A typical questionnaire is contained in Appendix 4

3.3.3 Duties

The duties of the Person in Charge are as follows:

- To ensure the execution only of the work he has been instructed to carry out. He must do so in strict conformity with the MOD Safety Rules and Procedures and any other safety requirements which are necessary for the safe conduct of the work
- To be in possession of a Permit to Work Petroleum Hazardous Area, properly completed and signed, and be fully conversant, and able to ensure compliance, with the conditions set out in the Permit to Work

Section 4 Relationship between the duties of the Authorised Person Petroleum and the Person in Charge

4.1 DUTIES

In addition to the description of the duties of the Authorised Person Petroleum and Person in Charge found in Sections 2 and 3 respectively, the following outlines the relationship between their various duties:

- The Authorised Person Petroleum and the Person in Charge must always perform the initial and final checks specified in the Permit to Work Petroleum
- The Authorised Person Petroleum and the Person in Charge must carry out joint simultaneous gas concentration and oxygen percentage tests when required by the MOD Safety Rules and Procedures
- The Person in Charge must carry out additional gas concentration and oxygen percentage tests between the tests described above as required by the MOD Safety Rules and Procedures
- The Authorised Person Petroleum may visit the work site at any time to check that the conditions of the Permit to Work Petroleum are being adhered to by the Person in Charge
- The Person in Charge must always be present at the work site when any of the following actions are taking place:
 - Hot work is being carried out
 - Work is taking place in tanks or confined spaces
 - Leaded products and leaded sludge are being handled, including work on equipment which has been exposed to leaded products
 - Toxic products are being handled, including water bottoms of AVTUR F34 which will contain toxic additives (fuel systems icing inhibitor—FSII), and equipment which has been exposed to toxic products
- For other work in Restricted Areas he must inform the Authorised Person Petroleum verbally if he is to absent himself for more than 30 minutes from the area (excluding meal and refreshment breaks) while the work is

in progress. Under such circumstances the Authorised Person Petroleum will decide whether it is necessary to carry out checks and/or tests before recommencement of work

- The Authorised Person Petroleum is to keep the Person in Charge aware of his movements and provide details of how he may be contacted. In the case of work in Restricted Areas his movements must be such that he can reach the work site within 30 minutes
- On completion of the work the necessary checks and procedures, as required by the MOD Safety Rules and Procedures must be carried out by the Authorised Person Petroleum and the Person in Charge, before the Authorised Person Petroleum cancels the Permit to Work Petroleum
- If a contractor wishes to change his Person in Charge, the Authorised Person Petroleum must be informed before the change is made. The Authorised Person Petroleum is then to withdraw and cancel the Permit to Work Petroleum, and carry out all of the prescribed checks for the issue of a new Permit to Work Petroleum, to the replacement Person in Charge

Section 5 Permits to work petroleum and recording of gas and oxygen tests

5.1 RESPONSIBILITIES OF THE OPERATING AUTHORITY AND THE AUTHORISED PERSON PETROLEUM

5.1.1 Introduction

The ultimate responsibility for the safety of all personnel working on the MOD Estate is vested in the Commanding Officer, Head of Establishment or Officer in Charge of a particular establishment. The preparation and communication of safe systems of work which enable the risks of tasks to be fully analysed, are tools for the Management of Health and Safety at Work. Every person at work on the MOD Estate has safety responsibilities. Those of the Operating Authority and the Authorised Person Petroleum are crucial to the safety of the maintenance personnel, and the communication of the effects of maintenance activities on petroleum installations, to those who take an overall view of safety for the establishment. A permit system has been prepared to enable the safety matters at the petroleum installation to be managed, and to fit into site systems for the evaluation of external safety matters.

5.1.2 Permit System

There are a number of documents to be completed to ensure that work is properly authorised. These are:

- **Notification List.** This is prepared by the Authorised Person Petroleum as a list of Hazardous Area works planned by location. The Operating Authority will endorse the whole list or part of the list according to the situation. This is a method of formalising the communication between the Authorised Person Petroleum and the Operating Authority to ensure that the Operating Authority is aware of the planned tasks, when they are to be performed, and to enable the Operating Authority to give permission to proceed or otherwise. The jobs can be performed during normal operations at the installation, and there is no need for the Operating Authority to authorise each Permit to Work Petroleum Hazardous Area. This is done by the Authorised Person Petroleum. The Operating Authority may require the list to be completed for maintenance visits which do not require permits, as a local means of entry control to hazardous areas. This is a matter for local decision and procedural action
- **Permit to Work Petroleum Hazardous Area.** This is raised by the Authorised Person Petroleum and signed by the Person in Charge

- **Operating Authority—Authorisation for Restricted Area Permits to be raised** . This document is raised by the Authorised Person Petroleum at the appropriate stage in the planning of the job, in consultation with the Operating Authority. It is authorised by the Operating Authority. The form provides the Operating Authority with a central record to aid the co-ordination of operations and maintenance at petroleum installations, and facilitates the management of safety. A copy of the document can be used as part of an establishment safety management system, by communicating the job risks to the wider establishment. The Operating Authority agrees to, and defines the cessation of operations at the installation to permit the Restricted Area to be set up. There may be related operations at other installations which must also cease. These matters are to be defined on the permit.

There is an expectation of a delay between the job planning stage, including the completion of the Operating Authority Authorisation for Restricted Area Permits to be Raised by the Authorised Person Petroleum, and the authorisation of the document by the Operating Authority to permit the checking of the establishment wide safety implications of the job.

The Operating Authority is responsible for communicating the decision to set up a Restricted Area to the operating staff, so that the installation can be put into the required condition for the commencement of work, and the staff withdrawn when the Restricted Area is set up.

When hot work is to be conducted at petroleum installations, there are recommended precautions for action by the Operating Authority. If there is a base fire service, they should be informed and placed on standby for the duration of the hot work permit. If the fire cover is provided by the local authority, they should be advised of the nature of the activity in case an emergency arises, and informed when the job is complete.

- **Permit to Work Petroleum Restricted Area.** This is completed by the Authorised Person Petroleum and signed by the Person in Charge. The authority to raise Restricted Area Permits given to the Authorised Person Petroleum, does mean that a series of permits for key stages of a job can then be raised. The implementation of a major task may require a consecutive series of Restricted Area Permits to be raised for the stages of the task, to account for the different hazards to be controlled

5.2 PERMITS TO WORK PETROLEUM

5.2.1 When to Issue

A Permit to Work Petroleum must be issued for all work on petroleum installations except for the following:-

- External inspection not involving the use of tools or equipment
- Work on Class III petroleum installations not involving hot work, cold work or confined space entry
- Hot work or cold work at Class III installations which is not performed on or near tanks or petroleum handling equipment which contains or has contained product

Note: Near in this context is within 6 metres.

- Routine maintenance and checking at kerbside filling stations carried out under Reference 31

Note: Work at kerbside installations which is not covered by Reference 31 must be controlled by the Authorised Person Petroleum.

5.2.2 Forms

The formats of the various documents cited in paragraph 5.1.2 are contained in Appendix 4. In addition, Appendix 4 contains a certificate for use when electrical equipment is to be proved dead. Permit books are to be pre-printed with a unique serial number for each permit contained within the book. Permit books are to be uniquely numbered.

5.2.3 Preparation

All of the documents cited at paragraph 5.1.2 include notes which define the action to be taken by the Operating Authority, the Authorised Person Petroleum, and the Person in Charge in order to establish permission for works to be initiated and normal operations restored (the latter applies to Restricted Areas). The Notification List and the Operating Authority Authorisation for Restricted Area Permits to be Raised are not valid unless signed by the Operating Authority and the Authorised Person Petroleum. A Permit to Work Petroleum is not valid until signed by the Authorised Person Petroleum at Part I, and the Person in Charge at Part II.

5.2.4 Number in Use

If work is planned simultaneously at two petroleum installations, a separate permit must be raised for work at each installation. A single permit can not be raised to control work in more than one hazardous area. When an area is restricted, only one Permit to Work Petroleum may be in use at any one time in the particular hazardous area to which the Restricted Area applies.

The guidance given is that normal practice should be to limit the number of Permit to Work Petroleum issued for a hazardous area to one at any point in time. However, certain facilities, eg standby generator houses, are located within the security fence surrounding fuel installations, but not within the hazardous area footprint for potential petroleum releases, yet work is controlled by permit within the fenced area. It is admissible for a Permit to Work Petroleum Hazardous Area to be raised for such works, simultaneously with a Permit to Work Petroleum Hazardous Area for works on the petroleum installation.

5.2.5 Validity—Hazardous Area

The maximum validity of the Permit to Work Petroleum Hazardous Area is one month. A daily check of the works is necessary to audit the continuing compliance of the Person in Charge with the terms of the permit. A formal note of the visit should be made in the Authorised Person Petroleum's diary.

5.2.6 Validity—Restricted Area

The maximum validity of a Permit to Work Petroleum Restricted Area is 5 days. The validity on a daily basis is a maximum of twelve hours.

The initial validity is defined in Part I, line 2 of the permit.

The subsequent renewal of the permit and the extension of the validity is authorised in Part II. This part of the permit must be completed in the second and subsequent days by the Authorised Person Petroleum and the Person in Charge after the initial gas tests have been taken and recorded, and the daily checks of the works and equipment have been completed.

5.2.7 Distribution

The Notification List, Operating Authority Authorisation for Restricted Area Permits to be Raised, and all Permits to Work Petroleum are to be completed in duplicate. The Operating Authority Authorisation for Restricted Area Permits to be Raised may be required in triplicate if used for establishment wide communication. For the Notification List and the Operating Authority Authorisation for Restricted Area Permits to be Raised, the Authorised Person Petroleum raises the document and retains the original. The Operating Authority retains a copy.

For all Permits to Work Petroleum, the original is to be kept on site by the Person in Charge and the copy retained by the Authorised Person Petroleum in the Permit to Work Petroleum Book. On completion or suspension of the work, Part III for the return of the Permit to Work Petroleum must be signed by the Person in Charge and the permit is cancelled in Part IV by the Authorised Person Petroleum.

5.2.8 Product Details

Details of the products handled in the area must always be given on the Permit to Work Petroleum. These details are to include the product handled, the Class of petroleum product, whether it is leaded or highly toxic, whether the facilities in which the product is handled are "Lead Free" and whether the product is heated.

5.2.9 Checking of Information

All checks required on the Permit to Work Petroleum Restricted Area must be carried out by the Authorised Person Petroleum and Person in Charge.

5.2.10 Gas Concentration

The Permit to Work Petroleum Restricted Area must stipulate the maximum gas concentrations applicable to the type of work to be undertaken. A Permit to Work Petroleum must be issued for each part of the work where working practices or requirements alter the maximum permissible gas concentration permitted by the MOD Safety Rules and Procedures e.g. change from cold work to hot work.

5.2.11 Minimum Oxygen Percentage

The Permit to Work Petroleum Restricted Area which does not specify Respiratory Protective Equipment to be worn for entry into confined spaces must stipulate a minimum oxygen percentage of 19%.

5.2.12 Maximum Oxygen Percentage

Permit to Work Petroleum Restricted Area covering work in confined spaces which involve the use of oxygen generating equipment must stipulate a maximum oxygen percentage of 22%.

5.2.13 Grades of Respiratory Protective Equipment and Personal Protective Equipment

Permit to Work Petroleum Restricted Area must stipulate the Grades of Respiratory Protective Equipment and Personal Protective Equipment and other safety equipment to be used.

5.2.14 Conditions for Withdrawal of the Permit to Work Petroleum

Permit to Work Petroleum must be withdrawn, if during the period of its validity, any of the following conditions apply:

The conditions under which it was issued change beyond the stipulated limits e.g. gas concentration and oxygen percentages

- A change of work is necessary which is not authorised on the original Permit to Work Petroleum
- Any personnel or contractors disregard the conditions of the Permit to Work Petroleum or the MOD Safety Rules and Procedures
- There is a failure of Safety Equipment
- A change of Authorised Person Petroleum or Person in Charge is necessary, e.g. through illness
- Prolonged absences of the Authorised Person Petroleum or Person in Charge, see Section 4.1
- The Operating Authority requests the discontinuation of the work
- Should any accident occur involving injury to personnel, damage to equipment or plant, spillage of product etc

5.3 RECORDING OF COMBUSTIBLE GAS TESTS IN RESTRICTED AREAS

5.3.1 Initial Gas Tests

The highest reading obtained from the initial gas tests, simultaneously carried out by the Authorised Person Petroleum and the Person in Charge using two instruments, will be recorded immediately after the tests, on the Permit to Work Petroleum Restricted Area. When the Authorised Person Petroleum is also the Person in Charge, another person will operate the second Multiple Gas Indicator.

5.3.2 Repeat Gas Tests

The minimum frequency of gas tests during the validity of the Permit to Work Petroleum Restricted Area is given in Section 6, Table 6.1. The highest reading obtained from repeat tests taken by the Authorised Person Petroleum and Person in Charge will be recorded as indicated on the back of the Permit to Work Petroleum Restricted Area and signed for by the testers immediately after the tests. Intermediate repeat tests required to be taken by the Person in Charge will be recorded immediately after the tests on his original Permit to Work Petroleum Restricted Area. This reading will be entered into the Authorised Person Petroleum's book copy and signed for by the Person in Charge on the next visit to site by the Authorised Person Petroleum.

5.3.3 Grass Cutting

Grass cutting does not require a Restricted Area to be set up but the Permit to Work Petroleum Restricted Area is to be used so that the results of gas concentration tests can be recorded on the reverse. Operations must cease, and operating staff be withdrawn, for this procedure. The general requirements for Restricted Area work should be used, including the Operating Authority Authorisation for Restricted Area Permits to be Raised. The need to cease operations must be noted on the Operating Authority Authorisation for Restricted Area Permits to be Raised, and communicated by the Operating Authority to the operating staff. The grass cutting permit cannot be raised by the Authorised Person Petroleum until these conditions have been met.

5.3.4 Electrical—Proving Dead

Certain electrical works are controlled by the Permit to Work Petroleum Hazardous Area in accordance with Section 6.14. A gas free certificate is provided for completion by the Authorised Person Petroleum in these circumstances.

The Authorised Person Petroleum must undertake gas tests and confirm the gas level to be less than 1% of the Lower Explosive Limit, before raising a gas free certificate, to permit the electrical equipment to be opened and proved dead.

5.4 RECORDING OF OXYGEN PERCENTAGE TESTING IN CONFINED SPACES

5.4.1 Initial Oxygen Percentage Tests

The initial oxygen percentage reading which represents a worst case when compared with the limits (19 and 22%), will be recorded immediately after the tests, on the Permit to Work Petroleum Restricted Area. The reading will be obtained from the results of two instruments used simultaneously by the Authorised Person Petroleum and Person in Charge. When the Authorised Person Petroleum is also the Person in Charge, another person will operate the second Multiple Gas Indicator.

5.4.2 Repeat Oxygen Percentage Tests

The minimum frequency of oxygen percentage tests whilst work is undertaken in confined spaces is given in Section 6 (Table 6.2). The closest reading obtained from repeat tests taken by the Authorised Person Petroleum and Person in Charge to the stipulated limits (19 and 22%) will be recorded as indicated on the back of the Permit to Work Petroleum Restricted Area and signed for by the testers immediately after the tests.

Intermediate repeat tests required to be taken by the Person in Charge recorded immediately after taking the tests, on the original Permit to Work Petroleum Restricted Area, and the closest reading to the stipulated limits (19 and 22%) will be entered. These readings will be recorded on the Authorised Person Petroleum's copy and signed for by the Person in Charge on the next visit to site by the Authorised Person Petroleum.

Section 6 Safety rules, procedures and guidance for work on petroleum installations

The Safety Rules and Procedures contained in this section without the Guidance Notes are contained in a Poster. The posters must be displayed at all installations containing Class I and Class II petroleum products, and at the maintenance office/workshop. The poster must also be displayed when a Restricted Area is set up at a Class III installation. The poster must be available for temporary display at works as judged necessary by the Operating Authority or the Authorised Person Petroleum.

There are a number of additional notes for guidance which are printed in italics for ease of identification.

6.1 HAZARDOUS AREA

A Hazardous Area is the area surrounding a point where petroleum emissions could occur as liquid or gas. The extent of the area is specified by the Operating Authority, and is indicated by notices.

Note: In practice a Hazardous Area is an area where normal operations e.g. receiving, storing and dispensing of petroleum can be carried out safely at minimum distances from possible sources of ignition. The minimum safety distances from tanks, off-load and dispense points, vents etc to boundaries or uncontrolled areas are stipulated by the Operating Authority and are related to the Class of Petroleum being stored and handled and the type of installation.

There are no safety distances for Class III installations unless the product is heated above its flash point, or a Restricted Area is set up for hot work.

It is a requirement of Reference 21 that area classification drawings be produced for all new or modified petroleum installations. All fixed electrical equipment in the area must conform to References 19 and 28, and no equipment or tools used in the Hazardous Area must be capable of creating incendive sparks, or a source of ignition, unless used under the controlled conditions specified in Section 6 of the Safety Rules and Procedures.

There are many examples of RAF Bulk Petroleum Installations at which the security fence encloses both areas classified as hazardous, and also a wider non-hazardous area which may contain such installations as control rooms and standby generator rooms. Works on such installations are usually in close proximity to the petroleum installation, and as they are within the security fence, are to be controlled by the permit procedures.

Where hot work is required on the generator house, or when equipment which creates a hot work risk is to be used, it is essential that the Operating Authority and the Authorised Person Petroleum co-operate to ensure that the risks of introducing such equipment into the fenced area are assessed and that a safe system of work is implemented.

6.1.1 Permission to Enter

The permission of the Operating Authority must be obtained before entry. The formal procedure for obtaining permission is covered in Section 5, and includes the use of a Notification List which enables the Authorised Person Petroleum to gain permission from the Operating Authority for a number of Hazardous Area permits to be raised.

6.1.2 Smoking

Smoking or the carriage of smoking materials, matches or lighters is not permitted.

Note: Smoking materials, matches or lighters must be deposited outside the Hazardous Area before entry. In installations storing or handling only Class III petroleum, smoking may be permitted at the discretion of the Operating Authority in designated areas. This discretion will not apply where the Class III petroleum is artificially heated to temperatures above its flash point. This discretion will not apply when a Restricted Area has been set up.

6.1.3 Food

Food or beverages must not be taken into or consumed within a Hazardous Area.

6.1.4 Footwear

Footwear, which is studded or tipped with exposed metal, is not to be worn unless overshoes are also worn. This rule applies to Class I and II installations, and Class III installations where the product is heated to temperatures above its flash point.

The rule also applies at Class III installations when a Restricted Area has been set up.

6.1.5 Electronic Devices

The wearing or carrying of battery-operated electronic devices such as radios (1 or 2-way), calculators and hearing aids, and electronic car keys is forbidden at Class I and II installations unless they are certified intrinsically safe. Batteries must not be exposed or changed within the Hazardous Area.

This Rule also applies at Class III installations when a Restricted Area has been set up or when Class III product is heated to temperatures above its flash point.

Note: It is considered that the risk with electronic wrist watches is negligible and their use in a Hazardous Area can therefore be permitted.

6.1.6 Clothing

The changing or removal of clothing within the hazardous area is not permitted at Class I and II installations.

This Rule also applies at Class III installations when a Restricted Area has been set up or when Class III product is heated to temperatures above its flash point.

Note: The friction caused by changing or removing clothing can, in certain circumstances, cause a source of ignition due to electrostatic charge generated by the action. The clothing rule simply means that the changing of clothing is not permitted in a hazardous area.

6.1.7 Permit to Work Petroleum Hazardous Area

The Person in Charge must obtain a Permit to Work Petroleum Hazardous Area for all works on petroleum installations other than for:

- External inspection not involving the use of tools or not requiring entry into confined spaces
- Periodic routine maintenance and checking carried out at Filling Service Stations in accordance with Reference 31
- Work at Class III installations when hot work and/or confined space entry is not involved

Note: A Permit to Work Petroleum Hazardous Area can only be used where the risks of the work are low, when operations can continue at the installation, and if there is no need for a Restricted Area to be set up.

The work must be capable of being carried out safely by Works Services Management personnel, contractors employed by Works Services Manager, or others appointed to undertake the task, whilst normal petroleum handling operations by the Operating Authority are in progress at the installation. This type of low risk maintenance work must not include any task which exposes petroleum products in liquid, gas or vapour form, introduces a source of ignition, or involves confined space entry. Although not exhaustive, typical examples of work which can be undertaken under the control of a Permit to Work Petroleum Hazardous Area are:

External Painting

Tightening pipeline flanges and unions

Adjusting machinery and valve glands but not repacking

Connecting and disconnecting service hoses

Minor adjustment or replacement of instruments and equipment. Where such work involves the removal in situ of covers of instruments, which thereby defeat their safety features, a Permit to Work Petroleum Restricted Area is required.

There are many small heating and standby generator installations, which have tanks which cannot be entered because either they do not have manholes or the manholes are too small for safe entry. In such circumstances tank entry does not arise and any leaky / faulty tanks should be replaced and not repaired by hot work. This also applies to any leaking / faulty pipework. Such work is to be controlled by the Permit to Work Petroleum Hazardous Area and the contractor advised that hot work is not permitted.

6.1.8 Equipment

The use of equipment or apparatus liable to cause a source of ignition by heat, flame, arc or spark is prohibited when the concentration of gas is above 1% of the Lower Explosive Limit.

Note: Equipment which is likely to be a source of ignition is not permitted in a Hazardous Area in the normal course of operations and maintenance. When work is required which could give rise to a source of ignition, the appropriate

rules contained in the MOD Safety Rules and Procedures must be employed. The main approach is to establish a Restricted Area and implement the requirements for testing gas concentration levels in the area, with equipment access/use permitted when the concentration of gas is 1% of the Lower Explosive Limit or below. A special method of working has been developed to ensure safe grass cutting at Class I installations using internal combustion engine mowers, and a method of working has also been developed to cater for proving electrical equipment to be dead.

Possible sources of ignition are an open flame, a spark (electrical or otherwise) hot enough to ignite petroleum vapour, and machinery which has a surface temperature high enough to ignite petroleum vapour.

The explosion risk, from vapour induced into an engine through an air intake, is an additional hazard.

6.1.9 Electrical Safety

Electrical equipment and maintenance work are to comply with the MOD Electricity Safety Rules and Procedures. The conduct of electrical work in Hazardous Areas must be under the umbrella control of the Authorised Person Petroleum in accordance with the direction given in Section 6.14.

6.1.10 Cathodic Protection

Before any break is made in cathodically protected metallic pipelines or plant, the impressed current system is to be switched off and disconnected 24 hours before commencement of the work. Both sides of the intended pipeline break are to be electrically bonded together and earthed. The bonding requirement also applies to pipelines protected by sacrificial anode.

Note: It is important that electrical continuity is maintained throughout cathodically protected pipelines or plant to prevent the formation of incendive sparks during maintenance.

6.1.11 Spillage

All petroleum spillages are to be cleaned up immediately and action taken where required to prevent re-occurrence. When a spillage is considered serious enough to cause an increased risk of fire, explosion, asphyxiation, toxic poisoning, or ground pollution, a Restricted Area must be set up and action taken by the Authorised Person Petroleum, in accordance with the local spillage procedures.

If the Authorised Person Petroleum is on site when a maintenance or works related spillage occurs at an installation for which he has maintenance responsibility, he must perform the necessary action in accordance with the MOD Safety Rules and Procedures.

Each MOD establishment will have a spillage plan, and the Authorised Person Petroleum must be familiar with the overall plan, and the part which he is expected to play. In emergency situations, operations are to cease and Restricted Areas are to be set up by the Authorised Person Petroleum if he is first to the scene.

6.1.12 Waste Materials

Waste, materials used for cleaning purposes, and any material capable of ignition or spontaneous combustion, are to be removed immediately after use and not left in a Hazardous Area.

Note: Oily materials and cotton waste are capable of spontaneous combustion.

6.1.13 Vegetation

Grass and vegetation is to be kept short. Where weedkillers are used to control vegetation they must be of a type conforming to the MOD List of Permitted Chemicals in the Standard Specification for the Supply and Application of Herbicides including Total and Selective Weed Killers and Brushwood Killers. Sodium Chlorate must not be used.

Note: In dry weather grass and vegetation will become a fire hazard and must be kept as short as possible. Grass cuttings must be removed.

6.1.14 Grass Cutting

Grass cutting is to be carried out under a Permit to Work Petroleum Restricted Area (modified), and the permission of, and co-ordination with the Operating Authority, should be as the general requirements for Restricted Area works for Class I and Class II installations. The conduct of grass cutting is as follows:

- **Class I petroleum installations:**

Note: This is a special procedure to overcome the practical problem of grass cutting at Class I installations, and requires continuous monitoring of the combustible gas level, to be made by the Authorised Person Petroleum. If the continuous monitoring can not be performed by the Authorised Person Petroleum, the internal combustion engine grass cutters can not be used. The highest risk exists in close proximity to sources of release such as tank vents.

All petroleum transfer operations are to be stopped in the Hazardous Area

Electrically driven grass cutters can not be used

Internal combustion engine grass cutters may be used provided that the following safe system of working is adopted as a minimum:

The Authorised Person Petroleum must be present at the site for the entire cutting operation. Initially he takes combustible gas readings with a meter which has been zeroed and calibrated immediately prior to use. The test readings must be taken at all potential points of release of petroleum vapour. The gas reading must be at or below 1% of the Lower Explosive Limit for work to be authorised.

The gas readings must be witnessed by the person nominated by the grass cutting contractor as Person in Charge. Provided that all readings are at or below 1% of the Lower Explosive Limit, the Authorised Person Petroleum and the Person in Charge agree the highest figure for entry onto the front of the Modified Restricted Area Permit. The Person in Charge must sign the permit.

The Person in Charge and the Authorised Person Petroleum must remain at the site whilst grass cutting is in progress. The Authorised Person Petroleum must take combustible gas readings continuously, monitoring the risk locations. If a reading above 1% of the Lower Explosive Limit is experienced, work is to cease, the permit handed back to the Authorised Person Petroleum, and the grass cutting equipment withdrawn from the Hazardous Area. The

team, other than the leading hand, also withdraw until such time as continuous monitoring indicates a value of 1% of the Lower Explosive Limit or below.

The Authorised Person Petroleum must record the combustible gas readings on the Modified Restricted Area Permit, ensuring that at least one reading at each of the identified potential areas of petroleum release, is recorded every five minutes. If the gas level detected exceeds the prescribed limits, the fact must be recorded on the Modified Restricted Area Permit.

The gas testing frequency is summarised in Table 6.1 at the end of Section 6.

Note: With volatile Class I Petroleum products the possibility of vapour drift from potential sources of release must be assumed during the grass cutting, even if all operations are stopped to reduce venting of the tanks. It is also not considered practicable to carry out continuous combustible gas monitoring on moving internal engine driven grass cutting machines, therefore the above method or cold work methods only may be used in Class I petroleum Hazardous Areas.

- **Class II petroleum installations:**

Electrically driven machines are not permitted but internal combustion engine driven machines may be used provided:

All petroleum transfer operations are stopped in the Hazardous Area.

Gas concentration tests are to be taken in accordance with the normal procedures with limits as summarised in Table 6.1 at the end of Section 6. The allowable level of gas is 1% of the Lower Explosive Limit.

The site is free from vapour drift from any source.

Class II petroleum products are less volatile than Class I, and so internal combustion engine driven grass cutting machines may be used as long as the normal procedures for combustible gas testing are carried out. These procedures are covered in paragraph 6.2.6 with the test frequencies summarised in Table 6.1. (Table 6.1 is located at the end of Section 6).

- **Class III petroleum installations:**

As long as Class III products remain unheated, there is no restriction on grass cutting. However, if they become heated their classification can change and grass cutting methods appropriate to Class II or Class I must be used, dependent on the product and the heating process details.

Note: Grass should be eliminated wherever possible in Hazardous Areas at installations handling Class I and II petroleum products. On above ground unprotected installations with concrete bund walls and bunded area floors, vehicle hardstanding etc, this should be largely achievable. On protected mounded tanks, grass cannot be eliminated because it is essential to conserve the stability of the earth mounding. Consideration should be given to concreting as large an area as possible around the vents of such tanks without affecting the stability of the earth so it is not necessary to cut grass in these most hazardous locations.

6.1.15 Ventilation

Certain tasks require ventilation arrangements to be made to prevent the accumulation of gas, and to supply fresh air. Work must cease and personnel, tools and equipment be withdrawn if there is a breakdown of the ventilation arrangements provided.

6.1.16 Electrical Storms

The likelihood of electrical storms should be checked, as when they occur, all work must be stopped and all personnel, tools, plant and equipment withdrawn from the area.

Note: When there is a high risk of electrical storms, it is prudent not to start works on the installations.

6.2 RESTRICTED AREA

This is an area in which there is an increased risk of fire, explosion, asphyxiation or poisoning, due to spillage, defects or the nature of the work to be undertaken. Before a Restricted Area can be set up, all operations must cease and operating personnel be withdrawn. A Restricted Area is to be set up when petroleum products are exposed in liquid or vapour form, when there is a requirement to enter confined spaces, or there is a need for hot work to be undertaken.

Note: Further guidance in the many aspects of Restricted Areas is given in Appendix 8. The subjects covered in the Appendix include the determination of the extent of the area, dispersal of gas, setting up a Restricted Area, sources of escape of petroleum products, cessation of operations, and site and weather conditions.

6.2.1 Permission to Set Up a Restricted Area

The written permission of the Operating Authority is required before a Restricted Area can be set up, and a document is provided in Appendix 4 for use by the Operating Authority and the Authorised Person Petroleum to achieve this, and thus give the Authorised Person Petroleum permission to raise restricted area permits. This document is the Operating Authority -Authorisation for Restricted Area Permits to be Raised, and is described in Section 5.

Note: As operations must cease, and operating personnel are excluded from the Restricted Area, it is essential that a planned approach is adopted, so that the operational requirements of the Operating Authority can be fully taken into account. The Operating Authority Authorisation for Restricted area Permits to be Raised is to be filed in accordance with Section 12.

In case of major spillage or other emergency situation, the Restricted Area must be set up as a matter of urgency. In such situations the Authorised Person Petroleum must take immediate safety action which includes setting up the Restricted Area, and communicating with the Operating Authority to ensure operations cease. The Operating Authority Authorisation for Restricted area Permits to be Raised should be completed formally when the situation is under control.

6.2.2 Basic Safety Rules for Restricted Areas

The Safety Rules applicable to a Hazardous Area are to be observed in a Restricted Area for all Classes of petroleum and all types of installation.

Note: The Rules listed in Section 6.2 for Restricted Areas are in addition to those listed in Section 6.1 for Hazardous Areas. All apply to Class III installations and filling stations, as well as Class I and II installations.

6.2.3 Permit to Work Petroleum Restricted Area

The Person in Charge must obtain a Permit to Work Petroleum Restricted Area for all work in a Restricted Area.

Note: Refer to Section 5 for information on Restricted Area Permits.

6.2.4 Marking

When an area is restricted it is to be clearly marked by fencing, barricades or hazard warning tape suspended on posts. Warning notices in accordance with Section 11 are to be located at the entrances so that they can be read easily at all angles of approach. A wind indicator is to be erected.

Note: Warning notices are to be located around the boundary and at entrances in such a manner that they are clearly discernible to any person attempting to cross the boundary and gain access to the Restricted Area at any point. A wind sock or flag is to be erected at high level, or in an exposed position.

6.2.5 Permission to Enter

The permission of the Person in Charge is required before any personnel can enter the Restricted Area, other than the Authorised Person Petroleum.

Note: The Operating Authority also requires the permission of the Person in Charge for entry to the Restricted Area as it is the Person in Charge who is responsible for the safety of the work.

The Person in Charge is the only person authorised to permit entry of goods, forms of transport, mechanical plant or any other equipment into the Restricted Area.

The Person in Charge must ensure that all persons, goods, forms of transport, mechanical or electrical plant and any other equipment entering the Restricted Area conform with the Permit to Work Petroleum and the MOD Safety Rules and Procedures.

6.2.6 Gas Concentration Tests

Gas concentration tests are required to exercise the correct control over work within Restricted Areas. Such tests are also required when engine driven grass cutting machines are used, and also when gas free certification is required prior to proving electrical equipment to be dead. Tests are to be taken before the commencement of any work to check that the gas concentrations are within the limits stipulated on the Permit to Work Petroleum Restricted Area and in the MOD Safety Rules and Procedures.

Other than the special procedures for grass cutting at Class I installations and proving electrical systems dead, the work must commence within 2 hours of the initial tests or the tests are invalid and must be taken again. The minimum frequency, type of subsequent test, and who must carry out the test, will depend on the work to be undertaken. These details are summarised in Table 6.1 at the end of Section 6.

The instruments must be response-tested daily before use, at or near the site of work. The response test must be undertaken or witnessed by the Authorised Person Petroleum.

Note: Appendix 6 contains details of the performance specification of instruments, and further guidance on gas detection is included in Appendix 7.

Initial tests before entry into tanks or confined spaces, and daily tests before entry, must be taken through a manhole with the indicator outside the tank, using the aspirator and tube attachment to obtain samples within the tank. It is not permissible to lower the Multiple Gas Indicator into the confined space.

Note: Confined space entry is not permitted when the combustible gas concentration is above 20% of Lower Explosive Limit.

Gas concentration tests are to be made in still air at the lowest levels and at several locations, the highest reading being recorded on the back of the Permit to Work Petroleum Restricted Area. Ventilation equipment should be turned off to permit tests to be taken in still air.

A Multiple Gas Indicator used to detect a hydrocarbon is calibrated in air with an Oxygen level of approximately 20.9%. If there is a deficiency or enrichment in this Oxygen level then the Multiple Gas Indicator reading will be inaccurate. **It is therefore essential that when Hydrocarbon product is being measured in confined spaces, that the Oxygen level is also measured.**

Note: For procedures and requirements on testing and recording combustible gas concentrations in Restricted Areas, see Section 5.

6.2.7 Oxygen Percentage Tests

Oxygen percentage tests must always be taken in confined spaces when Hydrocarbon product is to be measured.

Tests are to be taken before initial entry and whilst personnel are in confined spaces, to check that oxygen percentages are within the limits stipulated on the Permit to Work Petroleum Restricted Area. The limits are the lowest reading permitted for oxygen deficiency and highest for oxygen enrichment.

Note: When Respiratory Protective Equipment is not worn the oxygen related hazards are deficiency, which causes asphyxiation, and oxygen enrichment which causes suppression of the respiratory stimulus. The latter hazard will only apply when there is a source of excess oxygen (e.g. leaks from equipment using oxygen).

If work is carried out in confined spaces with equipment using oxygen, for example, supplied by hose, the Oxygen Percentage Tests are to be carried out regardless of whether personnel wear Respiratory Protective Equipment. Oxygen cylinders are not permitted in confined spaces as part of works equipment. However, they are permitted in emergency, as part of life support systems.

When any hot work is undertaken inside a confined space with equipment which uses oxygen, there is the hazard of enhanced combustibility due to possible oxygen leaks. This hazard also applies when Respiratory Protective Equipment is worn.

Readings must be taken through a manhole with the indicator outside of the tank, with the sensor tube inside of the tank before initial entry and before entry daily into tanks. Subsequent tests before and during work must be taken inside the tank in accordance with Table 6.2 at the end of Section 6.

Before use, the Authorised Person Petroleum must assess that the Multiple Gas Indicator proposed for use is "fit for purpose"; further information is given in Appendix 6.

Instruments are to be response tested daily in fresh air near the site of work at an appropriate distance from the confined space to be entered. A reading of 20.9% oxygen by volume is to be obtained.

6.3 BEFORE ENTRY INTO TANKS

Note: See Reference 29 for details of tank cleaning.

The preliminary work as defined in Section 6.3.1 does not apply to filling station type and other small tanks, as entry to such tanks is not permitted under the MOD Safety Rules and Procedures.

6.3.1 Preliminary Work

Before any person enters a tank the following conditions must apply:

- The tank is to be pumped and drained of product as far as is practicable.
- Permanently installed internal pumps are to be isolated electrically as soon as they are no longer required for emptying and draining.
- Product, steam or hot water inlets and outlets are to be disconnected and blanked off, and any common vent pipe disconnected from the tank and blanked off.

Note: At older installations, when several tanks are connected to one vent outlet, the tank to be entered must be isolated from the venting of the other tanks.

- Electric heating and any other electrical connections are to be isolated.
- Adequate ventilation is to be provided to maintain the conditions specified in the Permit to Work Petroleum and elsewhere in the MOD Safety Rules and Procedures.
- Air intakes to ventilation systems, air operated equipment and Respiratory Protective Equipment are to be located in areas where they cannot be contaminated.

Note: The provision of adequate ventilation to maintain the conditions prescribed in the Permit to Work Petroleum is mandatory irrespective of whether Respiratory Protective Equipment plus Personal Protective Equipment is worn or not. When the work involved inside tanks results in the introduction of gases or liquids into them other than the petroleum products normally stored and handled, e.g. solvents in epoxy spray painting, it is the responsibility of the specialist contractor to provide the appropriate additional ventilation equipment which must satisfy the safety requirements of the task to be undertaken, and the MOD Safety Rules and Procedures.

Prevailing atmospheric conditions are also to be taken into account when locating air intakes to ventilation equipment.

- Air and water nozzles, ducts, paint spraying hoses, and all other portable equipment introduced into the area must be electrically conductive, bonded and earthed.
- Before tank entry, the combustible gas concentrations and oxygen percentages in the tank must be within the limits prescribed by the MOD Safety Rules and Procedures for the type of work to be undertaken.
- Respiratory Protective Equipment plus Personal Protective Equipment is to be worn before entry in accordance with Section 6.8 and Tables 6.3 and 6.4. (Table 6.3 and 6.4 are located at the end of Section 6).
- Internal fittings are to be removed as soon as possible after tank entry. Internal fittings may contain petroleum as a liquid or gas; typical examples are floating suction and swing arms.

6.3.2 Filling Stations and Other Small Tanks

Entry is not permitted into tanks at filling stations. This rule also applies to other small tanks.

Note: Tanks at older filling stations are generally small and fitted with one small manhole. They are difficult to gas-free and many have contained leaded products requiring breathing apparatus and personal protective equipment for entry even when the tanks are gas free. It is often impracticable for persons to enter such tanks wearing Respiratory Protective Equipment plus Personal Protective Equipment. Exit is even more difficult and could be impossible in case of emergency or collapse. Larger size tanks which are fitted with large diameter manhole openings may be installed at modern filling stations. For such tanks, and in exceptional circumstances, the Defence Estate Organisation (Works) Technical Authority can be consulted by the Authorising Engineer to ascertain if the entry rule can be waived.

6.4 COMBUSTIBLE GAS LIMITS

Note: The paragraphs 6.4.1 to 6.4.5 deal with petroleum vapours and the precautions necessary to eliminate associated risks. Oxygen enriched atmospheres are covered in Section 6.5.

When residual fuel oils, sillage and reclaimed fuel oil tanks, vessels, and confined spaces (which can be exposed to such petroleum products) require entry for maintenance, additional checks must be made for the presence of hydrogen sulfide. These checks are introduced in Section 6.6.

6.4.1 Maximum Gas Level

Entry is not permitted to any tank or confined space when the concentration of gas is above 20% of the Lower Explosive Limit.

Note: This Rule applies in all circumstances even when wearing Respiratory Protective Equipment plus Personal Protective Equipment.

6.4.2 Entry for Inspection Only

Entry is permitted to tanks for inspection only, when the concentration of gas is 20% of Lower Explosive Limit and below.

Note: At 20% of Lower Explosive Limit, it is unsafe for work, and the use of tools or equipment is not permitted.

6.4.3 Removal of Sludge

When the concentration of gas is 20% of Lower Explosive Limit or below, entry is permitted into tanks for the removal of sludge only, using non sparking cleaning equipment.

Note: When removing sludge from Class I product tanks, it is often not possible to retain the gas concentration level at or below 4% of Lower Explosive Limit [as defined in Section 6.4.4] due to the release of gas from the sludge. Sludge removal is therefore permitted for concentrations up to 20% of Lower Explosive Limit, provided that wooden shovels and buckets or other completely non sparking tools are used.

6.4.4 Cold Work

Entry and cold work is permitted in tanks or in any environment where the concentration of gas is 4% of the Lower Explosive Limit or below.

Cold Work includes the use of tools for erection, dismantling and cleaning, which are not liable to produce incendive sparks. It also includes work such as drilling, tapping and cutting performed in such a way as to limit the heat produced and keep the temperature of the tools and the work below 100 degrees C.

Note: Standard steel tools must be used only for the purpose for which they are designed. Improper use must be avoided. So called non-sparking tools should not be used as, in certain circumstances, they can be dangerous, and their presence can lead to a false sense of security and improper use.

6.4.5 Hot Work

Hot work is permitted in tanks or in any environment when the concentration of gas is 1% of Lower Explosive Limit or below, provided there is no vapour drift from any source, and tanks are free of all residual fuel, sludge, scale, deposits, and all other arisings.

On large Class III and heavy fuel oil tanks, an area of at least 6 metres in all directions from the potential hot work location, must be fully cleaned to bare metal, before hot work can commence. The floors and the walls below the hot work location must also be cleaned to the base metal.

Note: Hot work is potentially one of the most hazardous undertakings in petroleum installations. It is to be avoided whenever possible. When essential, it should be reduced to the shortest time possible by careful planning of work. Pipeline fabrication can often be performed outside the Restricted Area so that only connecting flanges require hot work within the Restricted Area. Cold work methods are preferred to hot working, e.g. cold cutting of pipelines as an alternative to burning.

In certain circumstances, hazards can be reduced by purging facilities to be worked on with inert gas, water dampening, or other methods. If concrete is to be broken up, the immediate vicinity (including the point of the tool) should be sprayed with water during the operation. The Defence Estate Organisation (Works) Technical Authority may be consulted on such methods by the Authorising Engineer.

Adequate fire fighting equipment must be available at the work site. The Operating Authority Fire Adviser should be informed of all hot work tasks at the planning stage.

Particular care must be taken that there are no hidden sources of petroleum, as liquid or vapour, at the work site. Examples of such sources are the surroundings of buried tanks or the underside of tank bottoms where previous leaks may have concentrated.

Before hot work is undertaken on tank base plates, particularly burning through them, holes should be made in the location of the hot work using cold work methods, and gas concentration tests made through them to confirm that there is no hazard from this source. (This guidance applies to Class I and II petroleum product tanks; see below for further notes on Class II and III tanks).

Class II and III petroleum products are not volatile at normal temperatures. Gas readings may not be obtained from tests under these conditions for Class II, and are unlikely to be obtained for Class III. If such products are subjected to intensive heat, e.g. when welding or burning, they become highly volatile and produce vapours within explosive limits.

As it is impracticable to clean Heavy Fuel Oil deposits from the underside of tank roofs, work on such roofs or demolition must be confined to cold work methods.

Cold work methods should be used on Class II and III petroleum tank floor plates. Hot work can be hazardous on the floor plates of such tanks because of the possibility of fuel deposits underneath from previous leaks. Gas tests taken through cold work cut holes in such plates might indicate the hazard for Class II product, but would be ineffective for Class III as no readings would be obtained even if the product was present on the underside of the plates at normal temperatures.

Whereas the internal cleaning of Class I and II petroleum tanks is relatively simple, internal cleaning of large Heavy Fuel Oil (Class III) tanks of all traces of product is difficult and costly. Therefore, on such tanks, the cleaning to bare metal can be limited to a radius of 6 metres from the location of the hot work. The floor and walls below the hot work locations must also be cleaned to bare metal. The remaining internal surfaces must be cleaned of all petroleum products and loose sludge and scale. Such tanks are chiefly located at MOD (Navy) Oil Fuel Depots. Smaller tanks will be completely cleaned to bare metal. Pipelines containing such products cannot be cleaned by flushing with water, therefore cold work methods must be used for cutting.

When it is difficult to maintain the gas concentration at 1% of Lower Explosive Limit or below e.g. in areas after a major spillage of Class I or II petroleum products, the use of air operated pumps and equipment should be considered.

6.5 HOT WORK—MAXIMUM OXYGEN PERCENTAGE

Hot work is not permitted when the percentage of oxygen by volume in a tank is 22% or above.

Note: An oxygen enriched atmosphere (22% by volume and above) can be caused by operations which involve equipment using oxygen, e.g. oxy-acetylene cutting, when leaks from equipment or supply hoses can occur. The release of oxygen to the confined space must be avoided, through equipment maintenance and operating procedures.

The risk of increased oxygen levels is enhanced combustibility and hence, possible spontaneous combustion.

6.6 HYDROGEN SULFIDE

If tanks, vessels or confined spaces which present a hydrogen sulfide risk are to be entered, gas detection is necessary, as part of a safe system of work.

Hydrogen sulfide may be present in residual fuel oil, sullage, and oil reclaimed from these sources. The tanks, vessels and confined spaces which handle the above products must be considered as presenting a risk.

Note: Residual fuel oils are the heavy, unrefined fuel oils left after distillation of the crude at the refinery. Such fuels may be found in fuel burning installations.

The safe system of work for tanks and confined spaces where there is a potential hydrogen sulfide risk, is to wear Respiratory Protective Equipment and Personal Protective Equipment for an initial tank inspection once the tank has been drained. This inspection will include the stirring of remaining fuel and sludge, to release the gas. Deeper sludge at the sump should be stirred. The gas level must be monitored, noting that the maximum permitted level for entry without Respiratory Protective Equipment is 10 parts per million.

Note: The recommended practical approach when hydrogen sulfide is detected, is to ventilate tanks to ensure that the hydrogen sulfide level is controlled to 2 or 3 ppm. Whenever the gas is encountered or its presence suspected at levels above 10 ppm, the most stringent precautions are to be taken to avoid the risk of over exposure. Alarms must be used, set at the short term exposure limit of 10 ppm, or Respiratory Protective Equipment must be worn.

In the case where alarms are worn and activated, the person must immediately withdraw to a safe area and alert any other person who may be at risk of exposure.

The readings must be recorded on the Permit to Work Petroleum Restricted Area, at least, at two hour intervals. Continuous monitoring by the Person in Charge is necessary.

Note: Exposure to hydrogen sulfide deadens the sense of smell and as such can lead to a false sense of security, when in fact, the concentration can have increased. Death can possibly occur at exposures of 500 ppm for a period of 30 minutes.

6.7 MEDICAL REQUIREMENTS

Any person requiring to wear Respiratory Protective Equipment to enter tanks or confined spaces, or to be engaged in the handling of leaded fuel or sludge, must have been medically examined and certified fit for the work.

Any person who feels unwell within 7 days of leaded fuel tank entry or handling leaded fuel or sludge, should consult his Doctor or hospital at once, and MOD personnel should show the Warning Card. The symptoms include headaches, insomnia, nightmares, mental confusion, excitement, agitation, abdominal pains and vomiting.

Note: All MOD personnel who are required to carry out such duties must be medically certified to do so in accordance with the current MOD medical requirements (See Section 8 and Appendix 5).

Contractors employed by a Works Services Manager to carry out such duties are responsible for ensuring that their personnel are medically fit to do so. This shall be a Works Services Manager contractual requirement for such work, and the contractor must confirm that his men are medically fit for the work to be undertaken, and they must carry evidence of fitness.

6.8 REQUIREMENTS FOR WEARING OF RESPIRATORY PROTECTIVE EQUIPMENT PLUS PERSONAL PROTECTIVE EQUIPMENT

6.8.1 Selecting the Equipment

The correct Respiratory Protective Equipment and Personal Protective Equipment as shown in Table 6.3 (at the end of Section 6) is to be worn if any of the following conditions apply:

- The environment is not gas free.

Note: The approach to tank and confined space entry advised in API 2015 [Cited in Reference 33] is to allow entry without Respiratory Protective Equipment provided that the level of flammable vapours is essentially at 0% of the Lower Explosive Limit for the product in question, the readings being taken by typical industrial combustible gas detectors.

- The tank or confined space has not been ventilated.
- The tank or confined space has a percentage volume of oxygen less than 19%.

Note: Oxygen deficiency may exist in any confined space, regardless of whether petroleum products have been stored within it. Refer also to Section 6.5 on the hazard of excess oxygen during hot work in tanks. Entry is prohibited if the oxygen percentage is above 22%.

- The tank contains, or at any time previously has contained, leaded fuel.
- The environment contains leaded products or gas.

Note: Entry to tanks storing leaded product, and access to leaded environments, always requires the use of Respiratory Protective Equipment and Personal Protective Equipment, irrespective of gas concentrations, or whether the tanks are epoxy coated or otherwise.

A tank satisfying the definition of "Lead Free" (Appendix 12) is not subject to this requirement, provided the work to be undertaken does not damage the internal coatings of the tank. Unleaded gasoline does contain lead and therefore is to be considered as a leaded product for the purpose of safety.

An ex-leaded tank which is currently storing non-leaded product, and satisfies the definition of "Lead Free", may be entered without Respiratory Protective Equipment providing:

The task does not involve hot work.

There is no damage to the internal epoxy coating exposing tank plates within the tanks.

All other tank entry conditions of the MOD Safety Rules and Procedures can be met.

- Toxic substances are at or above the published occupational exposure limits.

Note: Occupational exposure limits are published in Reference 32 and in the safety data sheets for the products handled. Typical safety data sheets for AVTUR indicate a long term exposure limit to vapour of 100 parts per million. The long term exposure limit is the Time Weighted Average level for an 8 hour exposure. AVTUR and Class III product tanks when drained, gas freed and ventilated should achieve very low levels of vapour, due to the low vapour pressure of these products. Entry without Respiratory Protective Equipment may be possible, subject to the completion of a risk assessment of hazards due

to the nature and duration of the work or inspection, and the level of toxic vapour. Exposure monitoring may be required to ensure that safe conditions are maintained below the published occupational exposure levels.

The Multiple Gas Indicators are of adequate accuracy for use in the identification and control of explosive risks, provided that they are correctly maintained and calibrated. However, these indicators are judged not to be of suitable accuracy for the control of exposure of personnel to petroleum products. When entry into a gas free tank is planned without breathing apparatus, the exposure should be checked by continuous monitoring by tubes or instruments calibrated for the product in question. Personnel must be withdrawn prior to the Occupational Exposure Level being reached.

- The tank is used to store highly toxic products.

Note: The petroleum products normally stored, which are considered to be "Highly Toxic" are leaded and unleaded gasoline, AVGAS, and on a qualified basis AVTUR F34. Respiratory Protective Equipment and Personal Protective Equipment must always be worn before entry into tanks currently storing these products. Fuel Systems Icing Inhibitor (FSII) is toxic, and is present in AVTUR F34. Water which separates from AVTUR F34 will contain Fuel Systems Icing Inhibitor, and is therefore toxic. This water may collect at the tank bottom, or be transferred into a slops tank. When the water has been removed, the residual fuel containing Fuel Systems Icing Inhibitor is not considered to be toxic provided that the occupational exposure level of the fuel is not exceeded. It is recommended that the Authorised Person Petroleum confers with the Operating Authority to ensure that copies of the data sheets for the products and additives which are in current use are available for distribution to potential contractors.

- When work is undertaken which gives rise to toxic fumes in a tank e.g. the use of volatile cleaning liquids or compounds, and spray painting.

Note: The introduction of volatile cleaning products or solvents or their compounds in spray painting processes will cause gas concentrations to develop within tanks. Apart from the requirement to wear Respiratory Protective Equipment during such work, it is essential that adequate ventilation arrangements are made to deal with gas concentrations produced. Ventilation arrangements which would be adequate to deal with a gas free tank may not be sufficient to handle the vapours produced by such processes. Only specialised contractors, who are thoroughly conversant with the hazards of their processes should be used for such work.

- When work is undertaken in confined spaces (including valve pits, chambers and excavations) and in any locations below ground level which involve:

Exposure of Class I and II petroleum product in carrying out the required maintenance or modifications. This covers planned maintenance and modifications e.g. removal of valve covers, and certain works on buried pipelines.

Handling spillages of Class I and II petroleum product in such locations. This covers emergency situations involving clearance of spillages.

- When work is carried out on Fuel System Icing Inhibitor (FSII) additive injection equipment which involves exposure of the additive.

Note: The injection equipment normally comprises additive tanks with pipelines to additive injection equipment. When exposed the Fuel Systems Icing Inhibitor is toxic, so Respiratory Protective Equipment and Personal Protective Equipment including gloves must be worn during maintenance work.

- When internal inspections or changes of elements (cartridges) are carried out on Aviation Fuel Filtration Equipment e.g. Filter Water Separators and Fuel Monitors.

Note: This Rule applies to Aviation Fuel Filtration equipment including those used in AVCAT supply systems.

- When opening a manhole on Class I petroleum tanks preparatory to gas freeing.

Note: The vapour space in a Class I petroleum tank can be at a pressure of 20 millibar above atmospheric, or at a higher pressure if vapour recovery equipment is fitted. When removing a manhole a large quantity of concentrated combustible gas is released and Respiratory Protective Equipment must therefore be worn. Caution is necessary in all cases when toxic vapour is released, to ensure that personnel are not exposed to the toxic risk. Particular attention is required to vapour release and drift. Where a potential risk is identified, Respiratory Protective Equipment must be worn.

- When sludge, residue, Personal Protective Equipment, plant, scrap or other materials contaminated with lead compounds are handled.
- When engaged in the cleaning of tanks which have contained leaded gasoline, the combustible gas testing rules apply, together with those for Respiratory Protective Equipment and Personal Protective Equipment. Leaded gasoline tank cleaning (Reference 30) affords guidance on the preparation for tank cleaning, safety harnesses, air hoses and cleaning operations, eg Sections 2,3,6,7,10 and Appendix 1 of Reference 30.

Note: Reference 30 provides useful material in the Sections cited above, however, other sections are not applicable as the safety and environmental advice does not meet the MOD requirements.

Table 6.4 located at the end of Section 6 gives examples of Respiratory Protective Equipment and Personal Protective Equipment use in relation to a range of hazardous situations.

6.8.2 Requirements within Tanks

Respiratory Protective Equipment is always to be worn in an unsafe atmosphere as stipulated by the MOD Safety Rules and Procedures. If Respiratory Protective Equipment is suspected of being faulty, the wearer is to leave the unsafe atmosphere immediately, and report the defect to the Person in Charge.

Note: These requirements must be stressed to all persons required to wear Respiratory Protective Equipment by the Person in Charge in all circumstances.

When the atmosphere is safe for entry to a tank or confined space without breathing apparatus, an adequate supply of respirable air must be maintained. This may be provided by natural ventilation if there are adequate bottom openings, but most likely will be supplied by mechanical ventilation.

Note: The provision of ventilation is a preventative measure to negate the effect of unforeseen changes in conditions. The mechanical ventilation techniques can include those employed for gas freeing operations.

6.8.3 Micro-Biological Hazards

Micro-organisms, if present in petroleum products, can proliferate in contact with water at tank bottoms, and also in sludge. There is also a possibility of micro-biological contamination growth in the form of slime on the tank walls at the interface and below.

When such contamination is suspected a risk assessment must be made by the Authorised Person Petroleum and the Person in Charge, and a new Permit to Work Petroleum Restricted Area raised, if the results of the assessment warrant a change in the permit conditions.

The micro-biological hazards include:

- Infection by inhalation of the micro-organisms in water droplets, by entry through open cuts, or by accidental ingestion.
- Allergic response induced by the inhalation of aerosols or dusts.

In temperate climates, the risk of microbiological contamination is low. However, at higher temperatures, and in cases where water bottoms are present, the risk increases. Microbiological contamination is encouraged by the presence of sea water and is therefore possible where ocean tanker and sullage operations take place.

The normal procedures relating to Personal Protective Equipment, Respiratory Protective Equipment and personal hygiene greatly reduce all of the above risks.

Special precautions may be necessary. For example, conditions for entry into a gas free AVTUR tank would be more stringent if a micro-biological risk were present.

6.9 MAINTENANCE OF EQUIPMENT AND SAFETY EQUIPMENT

There are certain conditions relating to the provision of equipment which are likely to apply when Respiratory Protective Equipment, Personal Protective Equipment and Safety Equipment are required:

- When the task is completed by the Works Services Management organisation.
- When the task is assigned to a competent sub contractor, who may also provide equipment for the Authorised Person Petroleum in some circumstances.

It is the employer's responsibility to ensure that suitable protective equipment (Respiratory Protective Equipment, Personal Protective Equipment, Safety Equipment) is provided to his employees who may be exposed to health and safety risks at work. The Works Services Management organisation is the employer when the task is completed by Works Services Management staff. In these cases the Works Services Manager must provide and maintain the equipment and the log books. The arrangements for the maintenance of equipment and record keeping are the responsibility of the Authorised Person Petroleum.

When the task is completed by a sub contractor who provides the equipment, it is the Authorised Person Petroleum's responsibility to check the log books before raising the Permit to Work Petroleum. The Person in Charge and the Authorised Person Petroleum each have a duty of care to inspect equipment both before the start of a task, and on a daily basis during progress of the task.

Respiratory Protective Equipment plus Personal Protective Equipment and Safety Equipment are to be properly maintained by the Person in Charge and inspected for serviceability and safe condition each day before being used.

Air hoses must be replaced after 100 hours' use on leaded fuel tanks.

Note: The Authorised Person Petroleum is responsible for carrying out the inspection of both Respiratory Protective Equipment and Personal Protective Equipment and any other safety equipment which he issues, each day before use. When the Person in Charge is a contractor he will carry out the daily inspection of the safety apparatus and equipment to be used by his personnel. The Authorised Person Petroleum is responsible for checking that the equipment certificates are in date. If the Authorised Person Petroleum observes any unserviceable or unsafe equipment being used by the contractor, he must immediately bring it to the attention of the Person in Charge and require its withdrawal until it is replaced or made serviceable and safe.

Records of use of Breathing Apparatus Grade III canisters and air hoses used on leaded fuel must be kept in accordance with Section 12.

6.10 ADDITIONAL SAFETY REQUIREMENTS

No person is allowed to enter a tank or confined space unless the following requirements are met:

- A rescue line and safety rescue harness is attached to the person entering the tank, or the harness is worn and the rescue line coiled at the entrance for use in an emergency.

Note: It is often difficult for a person wearing Personal Protective Equipment and Respiratory Protective Equipment with an airline to work efficiently with a lifeline in a tank with pillars. There is the additional danger in leaded and ex-leaded tanks that the lifeline will become contaminated with toxic material. For entry to horizontal tanks the rescue line must be attached to the safety rescue harness.

- A minimum tank entry team of three is necessary when Respiratory Protective Equipment and Personal Protective Equipment must be worn for entry. The first person enters the tank, the second person, also equipped with the appropriate grade of Respiratory Protective Equipment plus Personal Protective Equipment, must be present at the entrance ready to enter in an emergency and render assistance. The third person is to be present to call for further assistance in an emergency. The third person need not wear Respiratory Protective Equipment plus Personal Protective Equipment, but this should be available for use in an emergency, or if required for other reasons. The third person must not be exposed to toxic vapour and therefore must be instructed to stand upwind of any possible vapour drift, and in a location free from any toxic vapour hazard. There should be no doubt about the safety of the location of this team member, if doubt is raised, Respiratory Protective Equipment/Personal Protective Equipment must be worn. This matter is of particular importance in the case of vapour from leaded tanks.

Note: It is essential that all persons wearing Respiratory Protective Equipment and working inside are monitored from the outside. This involves regular inspection through the entrance to see as far as possible that the persons inside are in a satisfactory condition. It also involves feeding in and retracting airlines when this type of equipment is used.

There will be occasions when more than one person is required to work inside a tank. In such circumstances, the external team of two is still required.

- When Respiratory Protective Equipment and Personal Protective Equipment are not required, the team can be reduced to two persons. In these circumstances the tank must be thoroughly ventilated and the person outside of the tank must be able to summon help readily in an emergency.
- In any circumstances when a vertical lift could be required to remove a person from a tank appropriate lifting equipment is to be set up at the entrance to the tank prior to tank entry.

Note: It is extremely difficult to remove an injured or unconscious person from a tank when a vertical lift is required, e.g. to a top manhole on a horizontal tank, or vertical protected tank with roof manhole access only. Tripods with lifting tackle or other suitable equipment should be set up at the entrance and fully ready for use. Equipment specially designed for these circumstances is available and the Works Services Manager Safety Officer should be consulted regarding suitable manufacturers.

- The person located outside of the tank or confined space, who monitors the confined space operations, must be fully briefed on the action necessary to summon help in an emergency.

6.11 REQUIREMENTS FOR LEAVING TANKS

6.11.1 General

Respiratory Protective Equipment plus Personal Protective Equipment used in connection with petroleum product or sludge must be washed with a kerosene soaked cloth followed by warm soapy water before removal. The operation is to be performed by a dresser.

Note: Personnel and the necessary equipment must be on hand to carry out this cleaning operation.

6.11.2 Requirements after Removal of Respiratory Protective Equipment plus Personal Protective Equipment

After the removal of Respiratory Protective Equipment plus Personal Protective Equipment by the dresser, the wearer is not to smoke, eat or drink, or allow his hands to touch his skin or personal clothing before thoroughly washing hands and face using soap.

Note: Hands and face should be washed as soon as possible after removal of Respiratory Protective Equipment plus Personal Protective Equipment.

6.11.3 Special requirements for leaded and ex-leaded tanks

In addition to the rules above, the following additional precautions are to be taken when working in leaded conditions:

- Before any person works in a tank contaminated with leaded products or before handling leaded sludge in any environment, he is to change completely from his personal clothing into clean clothing which is to be made available on site for the purpose.
- Any person leaving the tank is to stand in a tray of soap solution and have his suit, gloves and boots washed down by the dresser. The dresser is to be wearing Personal Protective Equipment and Breathing Apparatus (see Section 6.7 and Table 6.3 at the end of Section 6).

Note: Further details of this procedure can be found in the Associated Ocel Booklet, Reference 30.

- Before leaving the site he is to have a bath or shower before resuming his personal clothing. Heavily contaminated clothing is to be placed in suitable impermeable bags and removed for burning.
- The requirement to change underclothing and bathe or shower before leaving the site is waived when the tank concerned has only contained leaded products in the past and has since been cleaned and is currently storing non-leaded products and the entry is confined to short duration for inspection and/or the taking of gas concentration tests only.

6.12 ARISINGS

The disposal of arisings is a Service responsibility because the Service/MOD is the owner of the waste. This section is included in the MOD Safety Rules and Procedures because of the safety implications of handling arisings, and the necessary interface between the works service and Service activities.

The treatment and disposal of arisings must be in accordance with the latest legislative requirements at References 4 to 8.

Sludge, scale or other arisings from leaded fuel and from tanks which have at any time contained leaded fuel and have not been deemed lead free, and any lead contaminated materials from tank cleaning or maintenance work, are to be treated or disposed of in accordance with hazardous waste disposal legislation.

The treatment and disposal of arisings must be carried out by registered specialised competent contractors. The contractor shall provide a method statement stating the procedures that are to be used to dispose of leaded sludge including method of containment, method of carriage and details of licensed disposal site for incineration. The organisation arranging the disposal must undertake checks to ensure that licences and claimed competences are correct for the particular waste concerned, and in accordance with the requirements of References 4 to 8. The organisation must also notify the Waste Regulation Authority of the movement of each consignment of special waste. A label must be provided for each batch of waste which describes:

- The exact type and name of waste.
- The location from which the waste arises.
- The process which produced the waste.
- The special problems associated with the waste.

Sludge and scale taken from vessels or tanks which have contained leaded fuels is highly toxic and flammable. It must be handled with care and always with the Respiratory Protective Equipment and Personal Protective Equipment required by the MOD Safety Rules and Procedures.

Sludge, scale or other arisings from petroleum tanks, sludge tanks or oil interceptors is not to be put into vehicles or containers already holding any material which can give rise to dangerous conditions by any reaction which may take place. Only vehicles and containers specially earmarked for this purpose are to be used.

Note: At MOD(Navy) Oil Fuel Depots and NATO Petroleum Depots Class III product waste, e.g. salt water contaminated fuel oils, may be discharged into sullage tanks for recovery to fuel oil storage, at the discretion of the Operating Authority.

Sludge and waste products whether leaded or non-leaded are not to be buried on site.

Note: Buried sludge may contaminate grazing areas or water sources.

6.13 PETROLEUM TANKS AND FACILITIES TEMPORARILY OUT OF USE OR DECLARED REDUNDANT

Special safety precautions and procedures as detailed in Appendix 10 are to be followed when petroleum tanks and facilities are temporarily taken out of use or are declared redundant.

Note: Tanks, pipelines and other facilities which have contained petroleum, oil or lubricant (especially those which have contained leaded products) can remain a safety hazard when emptied of product, taken out of use temporarily, or made redundant. In addition, a potential pollution hazard exists with tanks and pipelines abandoned in situ.

6.14 ELECTRICAL WORK AT PETROLEUM INSTALLATIONS

6.14.1 Petroleum Related Risks of Electrical Work

There are four attributes of electrical work on petroleum installations to be considered to enable the petroleum related risks to be controlled, by the safe systems of work described in the following paragraphs. The four attributes are in addition to the general requirements for the control of the electrical danger.

- The integrity of the type of protection of electrical equipment subject to maintenance must be restored when the maintenance is complete, and the integrity must be assured for new equipment installed. No alteration that might invalidate the certificate or other approval document relating to the explosion protection of the equipment should be made.
- Equipment must not be opened, or the protection disturbed, until it is electrically isolated, and a gas free condition established to prove dead.
- If hot work is required, or there are ignition risks, a continuous gas free environment must be established under the control of a Permit to Work Petroleum Restricted Area. Electrical testing can cause induced currents and voltages throughout an installation, due to earth bonding and lightning protection systems. To reduce the risks from incendive sparks, earth fault loop impedance tests are to be carried out under the control of a Permit to Work Petroleum Restricted Area.

- Maintenance of electrical equipment in hazardous areas should be carried out only by personnel having adequate training, experience, and theoretical knowledge to be considered as competent persons on electrical equipment installed in hazardous atmospheres.

6.14.2 Introduction—Co-ordination and Co-operation of Authorised Persons

The general framework for the control of work at petroleum installations also applies to electrical work. All electrical work in petroleum hazardous areas is to be controlled in accordance with the MOD Electricity Safety Rules and Procedures. These are to be applied under the control of the petroleum installation permits and safe working systems.

The planning of electrical work at petroleum installations includes a definition of the task and work method, with particular emphasis on:

- The elimination of the risk of creating a source of ignition within the hazardous area whilst undertaking the works task.
- The immobilising of control systems.
- The installation or restoration of the type of explosion proof protection as designed and certified for the electrical equipment in the hazardous area.
- Control of the safe system for electrical work. This is the responsibility of the Authorised Person Electrical, who then co-ordinates and co-operates with the Authorised Person Petroleum to enable the primary decision on the type of Permit to Work Petroleum to be made.
- The work planning which enables the Authorised Person Petroleum to co-ordinate the electrical work with, and seek the authority of the Operating Authority to conduct the work, as part of the overall programme of petroleum work.

6.14.3 Work Categories

Work is categorised as follows:

- Inspection work which does not require the use of tools or equipment by the electrical skilled person, and will therefore not require a Permit to Work Petroleum to be raised. Operating Authority permission will be required for access, co-ordinated by the Authorised Person Petroleum.
- Work at the control room or the standby generator house which is controlled by Permit to Work Petroleum because it is conducted within the fenced area, but is outside of the area classified as presenting a petroleum hazard. The need for an electrical permit for this work is dependent on the task, and is to be determined by the Authorised Person Electrical at the planning stage.

Note: There are many examples of RAF Bulk Petroleum Installations at which the security fence encloses both areas classified as hazardous, and also a wider non-hazardous area which may contain such installations as control rooms and standby generator rooms. Works on such installations are usually in close proximity to the petroleum installation, and as they are within the security fence, are to be controlled by the petroleum permit procedures.

- Electrical work which can be completed under the control of a Permit to Work Petroleum Hazardous Area includes work where equipment is to be opened and components replaced. Hot work or tools or processes which

require a gas free environment must not be introduced. Any limitations on operations should be identified at the planning stage and noted by the Authorised Person Petroleum on the Notification List and the Permit to Work Petroleum Hazardous Area. It is the responsibility of the Operating Authority to act on any operational limitations. The responsibility for the quality of work, which in many cases cannot be effectively checked visually when completed, is to be that of the skilled person.

Note: The objective of this approach is to avoid the need to set up a Restricted Area for a specific electrical task, yet to retain the necessary level of control. The procedure for all electrical work at petroleum installations requires isolation, gas free certification, proving dead, and the signature of the skilled person that the type of explosion proof protection as designed and certified for the electrical equipment in the hazardous area, is restored at the end of the job.

- Complex or lengthy electrical work and testing, and work which includes ignition risks, is controlled by the creation of a Restricted Area, the withdrawal of operating personnel, and the raising of Permit to Work Petroleum Restricted Area.

Note: When a Restricted Area is set up, the requirements for isolation, proving dead and restoration / installation of equipment to the type of protection remain. The gas testing is part of the Permit to Work Petroleum Restricted Area permit procedure.

The work categories and permit requirements are summarised in Table 6.5 which is located at the end of Section 6.

Note: There are demands imposed on the conduct of electrical work in hazardous areas. Reference 19, BS5345 Part 1, Section four, paragraph 28 states:

"The inspection, maintenance, testing, replacement and repair of apparatus, systems and installations should be carried out by persons whose training includes instruction on the various types of protection involved. Appropriate refresher training should be given from time to time."

6.14.4 The Responsibilities of the Authorised Person Electrical

The Authorised Person Electrical is responsible for:

- The planning of the electrical work.
- Checking that skilled persons used to carry out the work are suitably qualified and experienced to work on explosion proof protected equipment.
- Ensuring that the level of electrical control necessary for a particular task is exercised.

The principle adopted is that of using skilled persons to undertake the work, and to confirm by their signature that they have completed the work correctly.

Note: The typical sequence of events is summarised in the following steps:

- Overall planning to include electrical work: completed by the Works Services Management organisation, with input from the Authorised Person Electrical.

- *Detailed job planning and specific assessment of the level of control to be carried out by the Authorised Person Electrical. This includes a statement of the level of competence for the skilled person(s) required to undertake the work.*
- *Co-ordination and co-operation of the Authorised Person Electrical and the Authorised Person Petroleum to enable the Authorised Person Petroleum to decide the types of petroleum permits applicable to the jobs. If there are doubts on the possible ignition risks, a Restricted Area must be specified at the planning stage.*
- *The Authorised Person Petroleum seeks permission from the Operating Authority for works.*

When permission is formally received, arrangements to progress the work can be made.

6.14.5 Electrical Works Controlled by Petroleum Hazardous Area Permit

This procedure specifically refers to certain electrical tasks which include the requirement for equipment to be proved dead. As there is a risk of creation of a spark if the equipment is still energised, it cannot be opened until the area is certified as gas free.

Control of this work by Permit to Work Petroleum Hazardous Area in combination with the certification of the gas free condition avoids the need for setting up of a restricted area, and the closure of the installation for that work which is essentially mechanical work on electrical equipment.

Note: There are two specific requirements for such work from the petroleum safety viewpoint. The first is the above mentioned need for gas free certification prior to opening equipment and proving dead, the second is for the restoration of the equipment by the electrical skilled person to the correct explosion proof condition on completion of the work.

The procedure requires the use of the Permit to Work Petroleum Hazardous Area and a Gas Free Certificate.

The Authorised Person Petroleum raises the Permit to Work Petroleum with two points noted in the description of the work to be authorised:

- Electrical equipment is not to be opened until a gas free certificate has been issued by the Authorised Person Petroleum.
- The electrical equipment must be restored to the correct level of explosion proof protection.

Note: The combustible gas readings are taken and recorded by the Authorised Person Petroleum. If more than one item of equipment is to be opened, then readings should be taken at each item. If the level is over 1% of Lower Explosive Level, the Gas Free Certificate must not be issued, and the Permit to Work Petroleum Hazardous Area must be withdrawn, and the job replanned on the basis of a Permit to Work Petroleum Restricted Area. The Person in Charge of the electrical task signs the permit on job completion and as such confirms the restoration of the level of explosion proof protection.

6.14.6 Electrical Work Controlled by Restricted Area Permit

The electrical permits will be raised in accordance with the MOD Electricity Safety Rules and Procedures.

6.15 WORKS ORGANISATION AT PRODUCT RECEIPT ENCLOSURES

6.15.1 Background

The Product Receipt Enclosure contains the pressure reducing valve and other equipment associated with the termination of the supply pipeline to the base. The Oil and Pipeline Agency arrange the operation and maintenance of the off base pipeline system, with pipelines operated by one of a number of contractors. The responsibility for equipment, and its operation and maintenance, is vested in the Oil and Pipeline Agency.

As defined, the Product Receipt Enclosure should be an enclosed area, however there are examples where this is not the case. In addition, there can be on base facilities which are the responsibility of the base for operation and maintenance, located in the Product Receipt Enclosure.

There is a need to formally establish the lines of demarkation of the facilities, the operational and maintenance responsibilities, and the co-ordination and co-operation of all parties when works are required.

An excellent record of safe working for works on such enclosures has been achieved. The aim is to continue with carefully defined and managed practices for each Product Receipt Enclosure/airfield interface.

6.15.2 Defining Responsibility for Equipment

The nature of the enclosure and layout of the Product Receipt Enclosure will influence this task. If the Product Receipt Enclosure is a separate enclosure entered off base, with no access to base personnel, then the task is very simple. A written statement should be secured from the pipeline operator, defining the equipment which is his responsibility. Even with such installations there is a need to know if works are to take place at the Product Receipt Enclosure, so that the implications of such works can be taken into account by the base. Equally, it is necessary to advise the pipeline operator when works are planned on airfield fuel installations in the proximity of or directly related to the Product Receipt Enclosure.

It is most important that works on the pipeline operator's equipment are exclusively conducted by him. The local maintenance organisation must be formally advised on the limits of their responsibility, and the pipeline operator's equipment specifically excluded.

6.15.3 Communications prior to Works at the Product Receipt Enclosure

Strong operating links are established between the Service Supply Management and the pipeline operating company. Formal communication between the pipeline operator and the service supply management should be engaged at the planning stage for all works activity at the Product Receipt Enclosure, and all works activity on-base facilities which have an impact on the Product Receipt Enclosure, due to the proximity of the works or otherwise. The aim of this communication in the works context is to ensure that unsafe conditions are avoided. For example, gas freeing an airfield tank, whilst hot work is being performed at a nearby Product Receipt Enclosure.

The pipeline operating company will control works at the Product Receipt Enclosure using their standard safe system of work.

6.15.4 Management of the Risks of Works at the Product Receipt Enclosure

The Service Supply Manager must have time and opportunity to consider the effect of the works at the Products Receipt Enclosure on other petroleum installation works on site. He must co-operate with the pipeline operator similarly. The details/consequences of the works for an assessment of the general effect on operations at the base must be provided to those with overall base safety responsibilities.

Table 6.1 Minimum frequency of gas tests

TYPE OF WORK	GAS TESTS TO BE CARRIED OUT BY**	MINIMUM FREQUENCY OF TESTS TO BE TAKEN AND RECORDED
(a)	(b)	(c)
1.HOTWORK a. Before Commencement b. Ten minutes after commencement c. Whilst work proceeds d. Intermediate tests whilst work proceeds	Authorised Person Petroleum and Person in Charge Authorised Person Petroleum and Person in Charge Authorised Person Petroleum and Person in Charge Person in Charge	Initial test and before start of work daily 2nd initial test and after start of work daily 2 Hourly Hourly In addition to the above hourly recorded tests, the Person in Charge must monitor the gas concentration, at all times work is in progress.
2. COLD WORK INSIDE CONFINED SPACES a. Before commencement b. Whilst work proceeds c. Intermediate tests whilst work proceeds	Authorised Person Petroleum and Person in Charge Authorised Person Petroleum and Person in Charge Person in Charge	Initial test and before entry daily 4 Hourly 2 Hourly In addition to the above 2 hourly tests, the Person in Charge must monitor the gas concentration at all times work is in progress.

Table 6.1 Continued

TYPE OF WORK	GAS TESTS TO BE CARRIED OUT BY**	MINIMUM FREQUENCY OF TESTS TO BE TAKEN AND RECORDED
(a)	(b)	(c)
3. GAS FREEING CLASS I AND II TANKS AND CONFINED SPACES*** a. At commencement b. Ten minutes after commencement c. During first 8 hours of gas freeing d. Intermediate tests whilst gas freeing e. After first 8 hours	Authorised Person Petroleum and Person in Charge Authorised Person Petroleum and Person in Charge Authorised Person Petroleum and Person in Charge Person in Charge Authorised Person Petroleum and Person in Charge Person in Charge	Initial test and before start of work daily 2nd initial test and after start of work daily 2 Hourly Hourly In addition to the above hourly tests, the Person in Charge must monitor the gas concentration continuously whilst gas freeing is in progress. This is required for the first 8 hours.* 8 Hourly 4 Hourly
4. SPECIAL PROCEDURE—GRASS CUTTING WITH INTERNAL COMBUSTION ENGINE MOWER AT CLASS I INSTALLATIONS a. Before commencement b. During cutting	Authorised Person Petroleum (Person in Charge to witness) Authorised Person Petroleum (Person in Charge to witness)	Initial test at all points of potential petroleum release Continuous testing with records for each potential point of release made at five minute intervals

Table 6.1 Continued

TYPE OF WORK	GAS TESTS TO BE CARRIED OUT BY**	MINIMUM FREQUENCY OF TESTS TO BE TAKEN AND RECORDED
(a)	(b)	(c)
5. COLD WORK (NOT IN CONFINED SPACES) AND GRASS CUTTING AT CLASS II INSTALLATIONS a. Before commencement b. Whilst work proceeds c. Intermediate tests whilst work proceeds	Authorised Person Petroleum and Person in Charge Authorised Person Petroleum and Person in Charge Person in Charge	Initial test and before start of work daily 8 Hourly 4 Hourly

* When gas freeing mounded or buried Class II petroleum tanks, continuous monitoring of the Restricted Area may be reduced to 2 hours in temperate climates (e.g. UK and Germany), provided that gas levels of 1% or less of Lower Explosive Limit are achieved in the Restricted Area.

** Joint tests carried out by Authorised Person Petroleum and Person in Charge must be taken simultaneously with separate instruments.

*** Tests should usually be taken at the downwind boundary of a Restricted Area. In still air conditions tests should be taken at several locations around the perimeter of the Restricted Area. The frequency of testing may have to be increased in changeable weather conditions particularly when Class I products are involved.

Table 6.2 *Minimum frequency of oxygen percentage tests (See section 6.2.7)*

TYPE OF WORK	OXYGEN PERCENTAGE TESTS CARRIED OUT BY*	MINIMUM FREQUENCY OF TESTS TO BE TAKEN AND RECORDED
(a)	(b)	(c)
<p>1. Confined space entry when Respiratory Protective Equipment is not worn for cold work or hot work, and equipment consuming oxygen is not used.</p> <p>b. Initial tests</p> <p>b. Whilst personnel are in the confined space</p> <p>c. Intermediate tests whilst personnel are in the confined space</p>	<p>Authorised Person Petroleum and Person in Charge</p> <p>Authorised Person Petroleum and Person in Charge</p> <p>Person in Charge</p>	<p>Initial test before entry</p> <p>Before entry daily</p> <p>4 Hourly</p>
<p>2. Confined space entry whether or not Breathing Apparatus is being worn, for hot work when equipment consuming oxygen is being used.</p> <p>a. Initial tests</p> <p>b. Whilst hot work proceeds</p> <p>c. Intermediate tests whilst hot work proceeds</p>	<p>Authorised Person Petroleum and Person in Charge</p> <p>Authorised Person Petroleum and Person in Charge</p> <p>Person in Charge</p> <p>In addition to the above 2 hourly tests, the Person in Charge must monitor the oxygen level at all times personnel are in the confined space.</p>	<p>Initial tests before entry</p> <p>4 Hourly</p> <p>2 Hourly</p>

* Joint tests carried out by the Authorised Person Petroleum and Person in Charge must be taken simultaneously with separate instruments (see Section 6.2.7)

Hydrocarbon gas detectors are not accurate if the oxygen level varies from the expected ambient level. Oxygen tests are therefore necessary prior to hydrocarbon gas tests in confined spaces as a precautionary measure.

Table 6.3 *Grades of Respiratory Protective Equipment [RPE] and Personal Protective Equipment [PPE] to be worn in environments when their use is stipulated in section 6.8.1*

HAZARD	ENVIRONMENT					
	Within Tanks- Tank Cleaning and Maintenance Work		Within Tanks- Inspection and Work of Short Duration (less than 15 Minutes)		Outside Tanks	
	RPE GRADE	PPE GRADE	RPE GRADE	PPE GRADE	RPE GRADE	PPE GRADE
All Class I Petroleum and Toxic Fumes	IA IB	IA IB	IA IB IC	IA IB IC	I II III	I II
Leaded Sludge	IA IB	IA IB	IA IB IC	IA IB IC	IA IB	IA IB
All Class II and III POL	IA IB IC	I***	IA IB IC	I***	I II III	I II
Lack of Ventilation Oxygen Deficiency	I	—	I	—	—	—

*** Grade II Personal Protective Equipment can be used instead of Grade I Personal Protective Equipment when the main surfaces of the tank, including the bottom, are free of liquid.

The table illustrates a range of Respiratory Protective Equipment and Personal Protective Equipment which can be used to protect against defined hazards. Both the Authorised Person Petroleum and the Person in Charge are required to perform risk assessments, and to select the appropriate Respiratory Protective Equipment and Personal Protective Equipment which is necessary to afford protection against the anticipated risks.

The table acts as a minimum basis for selection. When more than one grade of equipment is cited in the table, the risk assessment provides the means of selection.

Table 6.4 is provided to give further detailed guidance on equipment selection relative to conditions which can be encountered.

Table 6.4 *Hazardous situations and examples of respiratory protective equipment and personal protective equipment*

HAZARDOUS SITUATION	RESPIRATORY PROTECTIVE EQUIPMENT GRADE	COMMENTS ON PERSONAL PROTECTIVE EQUIPMENT
Entry to a Class I petroleum product tank or confined space for work.	IA	Full suit, with integral gloves and boots, or with separate gloves and boots.
Risk of exposure to a major spillage of Class I petroleum liquid.	IA	Full suit, with integral gloves and boots, or with separate gloves and boots.
Exposure to Class I petroleum vapour outside of a tank.	I, II, III	The respiratory protective equipment is the principal requirement, antistatic shoes and overalls are required.
Exposure to FSII within FSII tanks or confined spaces.	IA	Full suit, with integral gloves and boots, or with separate gloves and boots.
Entry to AVTUR-F34 tank which has water bottom [possible high FSII concentration]	IA	Full suit, with integral gloves and boots, or with separate gloves and boots.
Entry to fully drained AVTUR-F34 tank or confined space without a water bottom, but with a gas reading of over 1% of Lower Explosive Limit, for the purpose of cleaning or work for extended periods. Entry to any tank with a gas reading of over 1% of Lower Explosive Limit for the purpose of cleaning or work for extended periods.	IA	Full suit, with integral gloves and boots, or with separate gloves and boots.
Entry to fully drained, clean and well ventilated AVTUR tank or confined space with gas concentration reading of 0% Lower Explosive Limit, and with an oxygen level within permissible limits.	Breathing Apparatus may not be required.	Antistatic shoes and overalls.

Table 6.4 Continued

HAZARDOUS SITUATION	RESPIRATORY PROTECTIVE EQUIPMENT GRADE	COMMENTS ON PERSONAL PROTECTIVE EQUIPMENT
Exposure to AVTUR-F34, for example, working on drained but open filter vessels, including the handling of elements.	I, II, III	Suit to be in accordance with the Respiratory Protective Equipment selected, or overalls to be selected appropriate to the task. Antistatic Personal Protective Equipment is required.
Exposure to petroleum products other than Class I in outside conditions where the gas concentration is above 1% of Lower Explosive Limit.	I, II, III	The Respiratory Protective Equipment is the principal requirement, antistatic Personal Protective Equipment is required.
Oxygen deficiency in a tank or confined space.	IA, IC	Suit to be in accordance with the Respiratory Protective Equipment selected, and the substance contained in the tank.
Leaded or other toxic sludge in tanks.	IA	Full suit, integral gloves and boots.
Leaded sludge outside of tanks.	IA	Full suit, integral gloves and boots.
Inspection of tanks or work of short duration [less than 15 minutes] when the gas level is above 4% of Lower Explosive Limit.	IA, IB, IC	Suit to be in accordance with the Respiratory Protective Equipment selected and the substance contained in the tank.

Table 6.5 *Work categories*

CATEGORY OF ELECTRICAL WORK	PTW PETROLEUM	PTW ELECTRICAL	GAS FREE CERTIFICATE
Inspection work [excluding work within tanks or confined spaces, or where there is a risk of product release] which does not require the use of tools	Not required	Not required	Not required
Work inside the fence but outside the area technically classified as hazardous	Hazardous Area	Depends on the nature of the electrical task, and is determined by the Authorised Person Electrical	Not required
Work which can be performed under the control of a Permit to Work Petroleum Hazardous Area	Hazardous Area	Not applicable	Required before equipment can be opened to prove dead
Work which includes potential creation of an incendive condition due to the nature of the task or the equipment or tools needed to complete the task. Testing which can introduce currents or voltages generally to the installation is also controlled in the Electrical Safety Rules and procedures by a Sanction to Test.	Restricted Area	Applicable	Gas free recording is covered by the Permit to Work Petroleum Restricted Area

Section 7 Commissioning of new installations

7.1 APPROACH

The approach to the commissioning of new installations is governed by the responsibilities of the Commanding Officer, Head of Establishment or Officer in Charge under the regulations for the Management of Health and Safety at Work. The usual approach with new installations is for all equipment and controls to be tested prior to the introduction of any petroleum product to any part of the system.

The Project Manager, or Works Services Manager for a project assigned to him, is required by References 26 and 28 to prepare a commissioning procedure in advance of the event.

7.2 THE INTRODUCTION OF PETROLEUM TO A NEW INSTALLATION

The work associated with a new installation must be conducted in accordance with the MOD Safety Rules and Procedures once a petroleum product is introduced.

Before petroleum is introduced to an installation, a certificate is required from the Project Manager or the Works Services Manager, depending on the scale of the works, to confirm the suitability of the installation to receive product. The Operating Authority will then authorise the introduction of petroleum.

7.3 MANAGEMENT OF SAFETY WHEN PETROLEUM IS INTRODUCED

There are two models available for the management of safety of commissioning; one must be selected and all personnel involved must be fully briefed as a condition of allowing petroleum product to be supplied to the installation:

- **Contractor Authorising Engineer and Authorised Person:** In this model, the contractor is required to provide an Authorising Engineer and an Authorised Person Petroleum. Each must be trained and appointed to MOD requirements, and the Authorised Person must be fully familiar with the new facility due to his role in its construction.
- **Works Services Manager Authorising Engineer and Authorised Person:** This is the traditional model, to which one condition is added. The Authorised Person Petroleum must be given familiarisation training by the Project Manager/Designer/Construction Contractor, to enable the Authorising Engineer to recommend his appointment for the new installation.

The latter approach has the added benefit of advancing the training and appointment of the Authorised Person Petroleum to the new installation, whilst ensuring that a consistent application of the MOD Safety Rules and Procedures to the site is maintained. The pattern of working for permit authorisation by the Operating Authority is retained.

Section 8 Medical requirements

8.1 INTRODUCTION

All forms of breathing apparatus, Respiratory Protective Equipment, impose some additional breathing load on the wearer. It is important that individuals are not subjected to any additional health risks as the result of wearing Respiratory Protective Equipment, and that they do not suffer from any conditions of a medical, physical or mental nature which could give rise to problems as a result of its use.

Individuals must be physically equipped to perform the tasks which will be required whilst wearing Respiratory Protective Equipment. They must have sufficient stamina to complete the task, including the possibility of assistance with the rescue of a colleague from a confined space.

In order to be an effective worker within a confined space, the wearer must not suffer from claustrophobia, and must be of stable personality and not subject to panic attacks.

Individuals must not suffer from conditions which are likely to impair their fitness to wear Respiratory Protective Equipment

Wearers of Respiratory Protective Equipment should be subject to regular medical checks which can be varied according to the age and fitness of the individual. In any event wearers should be medically reviewed, at least on an annual basis.

The wearing of the correct Personal Protective Equipment eliminates the danger to personnel engaged in the handling of hazardous materials, however, medical controls are recommended as a precautionary measure. The precautions which are implemented for Civil Service employees include the use of a warning card. The card satisfies the dual purpose of recording medical fitness for Respiratory Protective Equipment, and acting as an advisory card for a doctor giving treatment for illness experienced after the conduct of works which required the use of Respiratory Protective Equipment and Personal Protective Equipment.

The warning card forms part of the works clearance procedure for Civil Service employees, within which personnel confirm that they are fit for the duties and sign a register.

8.2 DUTIES REQUIRING MEDICAL CLEARANCE

Examples of work which requires the use of Respiratory Protective Equipment, and hence medical clearance are:

- Entering tanks or confined spaces

- Handling leaded fuels or sludge
- Exposure to petroleum gas or vapour
- Internal inspections of filtration equipment
- Work in an environment where toxic vapour may be present
- Entry to irrespirable atmospheres

8.3 MEDICAL PRECAUTIONS

The current medical requirements and precautions for Government employees required to work with the aid of Respiratory Protective Equipment are contained in Appendix 5.

Generally, in view of the minimal risk of exposure to tetra-ethyl lead and other toxic substances, by Government employees (as opposed to tank cleaning contractors), there is no need for a formal system of health surveillance. In specific situations where the probability of exposure is increased, a formal system may be required.

8.4 FITNESS OF CONTRACTOR PERSONNEL

Contractor personnel employed by the Works Services Manager on the work described in Section 8.2 must be medically fit to carry out the duties and the contractor shall make his own arrangements for Medical Clearance and supervision of his staff. This shall be made a contractual requirement and particularly applies to personnel carrying out work which requires entry for cleaning and maintenance of tanks which have contained leaded fuels. The Associated Octel Booklet, Reference 30 includes medical certification in the supervisor (Person in Charge) check list prior to starting work, and the existence of such certification is to be confirmed by the Person in Charge, on the Permit to Work Petroleum.

Section 9 Safety, first aid and fire precaution training

9.1 INITIAL TRAINING

The Authorising Engineer Petroleum is to arrange the initial training of Authorised persons before appointment as required in Section 2.3.

9.2 SAFETY REFRESHER TRAINING

The Authorising Engineer Petroleum is to arrange for adequate refresher training for the Authorised Persons to ensure that they are fully conversant with the MOD Safety Rules and Procedures, and that any new developments in petroleum installation safety and other relevant safety matters are brought to their attention. MOD approved courses are available commercially.

Such training is to be arranged by the Authorising Engineer Petroleum at not more than 3-yearly intervals.

9.3 FIRST AID TRAINING

Personnel who are regularly required to carry out work on petroleum installations are to be instructed in First Aid. The training is to include:-

- Resuscitation including Artificial Respiration by the exhaled air method.
- Initial treatment of wounds, burns, fractures, shock and concussion.

Initial training and subsequent 3-yearly refresher training is to be arranged locally by the Authorising Engineer Petroleum for Works Services Management personnel.

9.4 FIRE TRAINING

Works Services Management personnel who are regularly required to carry out work at petroleum installations should be trained in the use of the "first aid" fire equipment provided at each installation, and the action to be taken in the event of fire. Such training should be arranged locally, and refresher training should be carried out every two years. The Authorised Person Petroleum must also ascertain the actions to be taken in an emergency at each location.

Section 10 Safety equipment

10.1 RESPIRATORY PROTECTIVE EQUIPMENT

10.1.1 Definitions

Whilst the definition of Respiratory Protective Equipment is contained in Appendix 12, the general distinction between the two broad categories of equipment is made. Equipment that provides uncontaminated air from an independent source provides the highest level of control over the quality of air for respiratory protection. Breathing apparatus is one form of this category of Respiratory Protective Equipment. Respirators which filter the air can be used in certain circumstances, but the filter cartridge must be selected for use with the particular vapour, and the effectiveness of the filter must be monitored.

10.1.2 Equipment Standards

All Respiratory Protective Equipment must either conform to the legislative requirements and lists of Health and Safety Executive approved standards and type approved equipment as Reference 11, or conform to The Personal Protective Equipment (EC Directive) (Amendment) Regulations 1994, Reference 10.

It is the responsibility of the equipment owner to ensure that the equipment complies with the above, and to provide written evidence of compliance. If written evidence cannot be provided, the equipment must not be used.

10.1.3 Correct Grade of Respiratory Protective Equipment

The correct grade of Respiratory Protective Equipment is to be selected and worn as a result of risk assessments conducted by the Authorised Person Petroleum and the Person in Charge, with reference to Tables 6.3 and 6.4 which are located at the end of Section 6 of the MOD Safety Rules and Procedures.

10.1.4 Training in the Use of Respiratory Protective Equipment

All personnel required to wear Respiratory Protective Equipment should receive instruction and training in the correct use and application, from a competent person, for the particular types of Respiratory Protective Equipment that they are required to use in the course of their duties.

10.1.5 Use of Cylinders

Compressed air cylinders in use in a confined space must be provided with a protective cover. This removes a possible source of a spark particularly from aluminium cylinders, and prevents accelerated corrosion of any damaged areas of the cylinders. The protective covers can normally be supplied by the cylinder supplier.

A system of control must be in place for the use of Breathing Apparatus supplied from cylinders or other containers, in order to ensure that work is contained within the limited available supply period.

10.1.6 Maintenance of Respiratory Protective Equipment

Where Respiratory Protective Equipment is provided for use, a system of inspection and maintenance must be put in place. The system should include inspection for correct functioning before and after each occasion of use, and also at monthly intervals. A record of the monthly inspections and servicing is required as indicated in Section 12.

Servicing is to be limited to that detailed in the manufacturer's user manual, and no attempt is to be made to replace components or make adjustments or repairs beyond the manufacturer's recommendations. Valves and regulators must be returned to the manufacturer at the intervals stipulated for servicing, repair and calibration. Records and a valid certificate of fitness for use must be available for each set of Respiratory Protective Equipment for presentation to the Authorised Person Petroleum on request.

The Authorised Person Petroleum must ensure that the above system is in place for equipment which he issues. It is important to note that any maintenance conducted on Respiratory Protective Equipment must be carried out by a competent person.

10.1.7 Disinfection of Respiratory Protective Equipment

All Respiratory Protective Equipment must be cleaned and disinfected after use in accordance with manufacturers' instructions. The equipment should be thoroughly dried, reassembled and placed in a protective container.

10.1.8 Wearing of Respiratory Protective Equipment with Spectacles and Beards

A good face seal cannot be achieved with the face piece by a person wearing normal spectacles or facial hair. Alternative Respiratory Protective Equipment such as a full suit and hood, is to be used when a poor seal is indicated.

10.2 AIR HOSES

10.2.1 Examination

All air hoses are to be examined daily before and after use for physical deterioration, e.g. cracks, holes or thinning of walls due to abrasive wear. Hoses found to be defective must be immediately withdrawn from service and repaired or discarded as applicable. Any such withdrawals, repairs or disposal should be recorded in the Log Book, see Section 12.

10.2.2 Recording of Use

A record must be kept of the number of hours air hoses are used on leaded tanks. After 100 hours use on leaded tanks, the hoses should be scrapped and this should be recorded in the Log Book. Hoses must be disposed of as hazardous waste, see Section 6.12.

10.3 USE OF CONTRACTORS' AIR HOSES AND COMPRESSORS

Where Government employees are required to use Contractors' air hoses and air compressors, they are to obtain written confirmation before using the equipment, from the Person in Charge, that the equipment conforms with the MOD Safety Rules and Procedures.

10.4 PERSONAL PROTECTIVE EQUIPMENT AND OTHER SAFETY EQUIPMENT

10.4.1 Correct Grade

The provision of Personal Protective Equipment must be in accordance with the requirements of the Personal Protective Equipment at Work Regulations, 1992 - Health and Safety Executive Guidance L25 (Reference 14). It is the employer's responsibility to ensure that suitable equipment is provided.

The Personal Protective Equipment must be selected as a result of risk assessments by the Authorised Person Petroleum and the Person in Charge. The minimum requirements for the grade of Personal Protective Equipment to be worn is stipulated in Table 6.3 of the MOD Safety Rules and Procedures. The grade required must be stated on the Permit to Work Petroleum.

10.4.2 Wearing and Cleaning

The requirements of the MOD Safety Rules and Procedures must be observed when dressing into, removing, and cleaning Personal Protective Equipment. The requirements for washing and bathing after use of the equipment are to be met (See Section 6.11).

10.4.3 Maintenance

The employer is responsible for Personal Protective Equipment and other Safety Equipment (e.g. harnesses, rescue lines) for use by his personnel. For example, the Authorised Person Petroleum must ensure that equipment provided by the Works Services Manager is regularly inspected to make sure that it is safe for use. Equipment must be inspected daily whilst in use, and at otherwise, at monthly intervals. A record of the monthly inspection and any servicing, is to be kept in accordance with Section 12.

As at 10.1.5, the person responsible for maintaining, servicing and repairing safety equipment must receive adequate training and be competent to carry out such tasks.

10.5 GUIDANCE IN THE USE OF RESPIRATORY PROTECTIVE EQUIPMENT AND PERSONAL PROTECTIVE EQUIPMENT

10.5.1 Selection of Respiratory Protective Equipment and Personal Protective Equipment

In selecting Respiratory Protective Equipment and Personal Protective Equipment from the range of types recommended in the MOD Safety Rules and Procedures, the following factors should be taken into consideration:

- Types of work to be undertaken.
- Frequency of use.
- Quantities and type of suitable equipment.
- Suitability/range of application of equipment.

With the increased use of Contractors for tank cleaning and maintenance, the wearing of Respiratory Protective Equipment and Personal Protective Equipment by Works Services Manager personnel is often limited to relatively short periods for carrying out inspections, and gas and oxygen tests within tanks and confined spaces.

10.5.2 Use of Open Circuit Breathing Apparatus

In the circumstances described in the preceding paragraph, the use of Positive Pressure Open Circuit Respiratory Protective Equipment Grade IC, with air bottles carried by the wearer, or from bottles mounted on a cradle, should be considered. This type of equipment obviates the need for compressors, and air and water filters which are required when constant flow type apparatus is used - Grade 1A and 1B. Air bottles are usually easily recharged at local fire stations. Such Respiratory Protective Equipment is suitable for use with Neoprene overalls with the hood incorporated.

10.5.3 Conditions Requiring the Use of Grade 1A and Grade 1B Respiratory Protective Equipment and Personal Protective Equipment

Grade 1A and 1B Respiratory Protective Equipment and Personal Protective Equipment must be used for cleaning and maintenance work in tanks currently storing leaded fuels. Grade 1B may be appropriate depending on the results of the risk assessment, with particular note being taken of the disadvantages of the blouse, in contrast to the full suit, for certain tasks.

Appropriate quantities of this type of equipment should be kept for such conditions. In assessing the appropriate quantities the following circumstances should be taken into consideration:

- Changeover from Aviation Leaded Gasoline fuels to AVTUR.
- The prohibition of entry into filling station motor gasoline underground tanks, see Section 6.3.
- Entry into leaded fuel tanks is much less frequent than hitherto, with the main exception of tanks at large MOD Army installations in UK and Germany, and the periodic inspection of AVGAS installations

10.5.4 Respiratory Protective Equipment for Work Outside Tanks

The use of fresh air hose apparatus - Grade II should also be considered for work requiring Breathing Apparatus outside tanks rather than the use of canister type masks - Grade III. The use of such equipment obviates the need to keep records of the hours in use of canisters and to periodically change them. The most frequent requirement to use Respiratory Protective Equipment in an open air environment is for the changing of filter water separator and fuel monitor elements. Grade II apparatus is convenient for use in such circumstances.

Grade III Respiratory Protective Equipment, gas filters, are covered by BS EN141 (Reference 17). The criteria for renewal of the gas filters is subjective, the wearer must leave the contaminated area, and remove the Respiratory Protective Equipment and replace the filter when there is an indication of the onset of additional breathing effort. There is a need to record the period of use of Respiratory Protective Equipment used for gas or vapour elimination. It is necessary to change filters before they become saturated with the gas or vapour, rather than attempt to rely on the user's sense of smell to detect the onset of saturation.

Such equipment must not be used by personnel who have a temporary or permanent problem with their sense of smell. The filter media suitable for petroleum products is now classified as Type A, and is supplied in three sizes

according to capacity. Size A3 is similar in size to the older versions produced to BS 2091 (Reference 20), and there are doubts about the availability of this size due to the general demand being for the smaller A2 and A1 sizes.

The type A2 filter should be replaced at the judgement of the user, or changed after 30 hours use, or six months from first fitment. The type A1 filter is for single task disposable use. The manufacturers' instructions on shelf life and use should be observed. Records must be kept for type A2 filters as per Section 12.

10.6 PROVISION OF SAFETY EQUIPMENT

10.6.1 Responsibility of Authorising Engineer Petroleum

The Authorising Engineer Petroleum is responsible for determining the equipment requirements for the bases/installations for which he is appointed. The extent of the equipment requirement will depend on several factors including the type of fuel installations, the nature of maintenance or inspection tasks to be undertaken by Works Services Management personnel, and the contractual requirements with, for example, tank cleaning sub contractors.

If the only petroleum facilities on site are motor transport filling stations, tank entry is not normally permitted, and so the equipment requirements are limited by this. If the facilities comprise a series of major AVTUR installations, the equipment for tank entry for inspection may be required as a minimum.

It is the responsibility of the Authorising Engineer to ensure that systems are established to ensure that any tank or confined space entry sub contractor, and any sub contractor subject to exposure to petroleum or other toxic product, is competent and hence, properly equipped, to deal with the anticipated risks.

The range of equipment which may be required includes Respiratory Protective Equipment, Personal Protective Equipment, Compressors, Filters, Air Hoses, a Confined Space Personnel Retrieval System, Harnesses for vertical lift, Life Lines, Multiple Gas Indicator, Response Test Kits, Eductors, Windsails, Turbo Lamps, Safety Torches, Resuscitation Apparatus, Safety Helmets and First Aid Kits, to meet the requirements of the Works Services Management personnel engaged on work at petroleum installations in the Establishment(s) under his control.

10.6.2 Responsibility of the Contractor

It is the responsibility of the Contractor to provide any Safety Equipment, as detailed in the preceding paragraphs, for his employees for work to be carried out in accordance with the MOD Safety Rules and Procedures.

10.6.3 Safety Helmets

Safety helmets should be provided and worn whenever there is a foreseeable risk of head injury and always in circumstances at petroleum installations:

- Where demolition work is being carried out.
- Where persons are working in excavations.
- Where persons are working beneath overhead work.
- Where persons are working adjacent to lifting apparatus which is in use.

Section 11 Notices

11.1 POSTER

The Poster, Safety Rules and Procedures for Work on Petroleum Installations, extracted from the MOD Safety Rules and Procedures, is to be displayed prominently so that it can be seen by those concerned as follows:

- Permanently in Works Services Management offices and in M and E Workshops from which petroleum installations are maintained.
- Permanently at bulk installations containing Class I and II petroleum products and at installations containing Class III petroleum as required by the Authority responsible for operating the installation(s).
- Temporarily in the vicinity whenever maintenance work is being undertaken on an installation containing Class I and II petroleum, when a Restricted Area is set up at an installation containing Class III products, and when required by the Operating Authority.

11.2 PERMANENT NOTICES

11.2.1 Hazardous Areas

It is the responsibility of the Operating Authority to ensure that permanent notices warning of fire and explosion in accordance with Reference 16, are prominently displayed to warn operating and maintenance staff at entrances to hazardous areas.

11.2.2 Leaded Fuel Tanks

A permanent notice must be posted at all tanks which fall within the leaded fuel tank definition. Such tanks include those which currently contain leaded or unleaded gasoline, and those tanks which have contained leaded gasoline in the past, and have not been treated to establish a lead free condition. The notices currently employed are as follows:

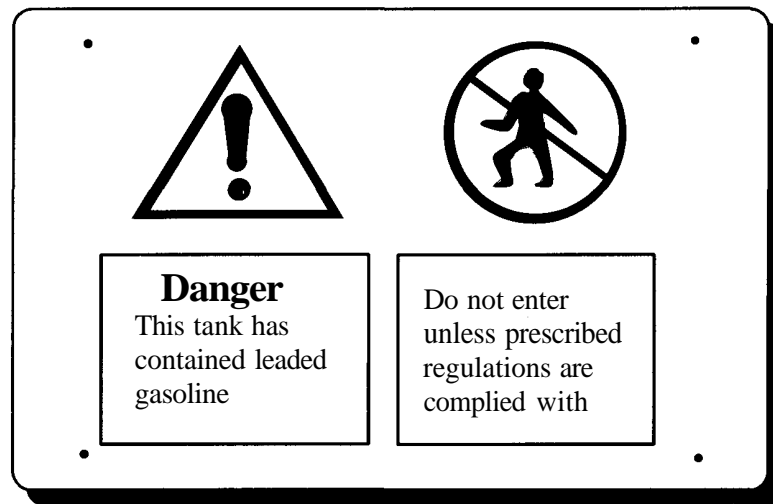
"THIS TANK HAS CONTAINED LEADED PETROLEUM SPIRIT. IT MUST NOT BE ENTERED UNLESS THE PRESCRIBED REGULATIONS ARE COMPLIED WITH"

The notice to be used, to comply with Reference 16, is rectangular, comprises the warning triangle and the no entry sign side by side. Below the Person in Charge are:

"Danger this tank has contained leaded gasoline," and, "Do not enter unless prescribed regulations are complied with."

See Figure 11.1:

Figure 11.1 Example sign



11.2.3 Planometric Diagrams

A planometric diagram of the system is to be displayed at bulk petroleum installations. These are not required at Motor Transport filling stations.

11.3 TEMPORARY NOTICES

11.3.1 Restricted Area Notices

The current temporary notices are:

"DANGER—RESTRICTED AREA MAINTENANCE WORK IN PROGRESS—NO ADMITTANCE WITHOUT AUTHORITY"

and are to be displayed at all locations where a Restricted Area has been set up. They are to be held at each Works Services Manager office with a responsibility for maintenance of petroleum installations. A new sign to comply with the requirements of Reference 16 must be provided when the EEC Directive is adopted.

11.3.2 Manhole Notices

The current temporary notice:

"MANHOLE MUST NOT BE CLOSED WITHOUT AUTHORITY"

must be displayed at all appropriate locations. This sign must also be replaced by one which complies with Reference 16 when the EEC Directive is adopted.

Section 12 Records

12.1 GENERAL

At each Works Services Management office with a responsibility for the maintenance of petroleum installations, a file is to be kept containing up to date records as detailed below:

- Copies of Permit to Work Petroleum and return cancellation declarations retained in the Permit to Work books. The books are to be kept for three years.
- The names, offices, home addresses and telephone numbers of every holder of a current Certificate of Appointment as Authorised Person Petroleum for the base.
- A sheet containing details of tanks including identification, size, product history, internal coating, whether lead free or leaded is to be maintained for the life of a tank. Note again that lead free is specially defined in the MOD Safety Rules and Procedures, and that unleaded gasoline is leaded from the view point of exposure to the product. Details of tanks abandoned on site are to be recorded.
- A detail sheet defining the equipment in and near to the Product Receipt Enclosure over which no maintenance responsibility exists. A clear demarkation of responsibilities between site maintenance and the Pipeline Operating Authority equipment must be made.
- A detail sheet containing particulars and identification of Respiratory Protective Equipment, Personal Protective Equipment and Safety Equipment held and maintained.
- Log Book pages completed by the Authorised Person Petroleum to record:
 - The examination of Respiratory Protective Equipment, Personal Protective Equipment and other Safety Equipment.
 - The number of hours in use of canisters for Respiratory Protective Equipment Grade III.
 - The duration of shelf life of Multiple Gas Indicator pellistor sensors. The shelf life starts on the date the sensor is dispatched by the manufacturer.
 - The Operation time in use of Multiple Gas Indicator pellistor sensors.

The number of hours in use of Air Hoses used in leaded fuel tanks, and the time of scrapping and renewal.

- The book of Operating Authority Authorisation for Restricted Area Permits to be Raised forms. This book is to be retained for three years.
- A file of Notification Lists.
- A diary in which the Authorised Person Petroleum records the following:

Record for each type of Respiratory Protective Equipment, Personal Protective Equipment.

When Multiple Gas Indicators are response tested, and readings, make and serial number of the instruments.

Any dangerous occurrences, e.g. spillage.

Job planning details, risk assessments, and communications with the Operating Authority prior to gaining permission to create a Restricted Area (if not covered by documents placed on a job file), and any verbal communications relating to safety with the Operating Authority responsible for the installations.

- A register of all staff who have been medically cleared for work on petroleum installations.

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Appendix 1

Examples of certificate of appointment for Authorised Person Petroleum and letter of appointment of Authorising Engineer Petroleum

CERTIFICATE OF APPOINTMENT AS AN AUTHORISED PERSON

1. This is to certify that..... is appointed as an Authorised Person Petroleum for the purposes of the MOD Safety Rules and Procedures.
2. This appointment is valid only until the expiry date indicated in Section 1.

Authorising Engineer

Signature

Name

Date

If found please return this certificate to:

.....
.....
.....
.....
.....

Section 1: Appointment Record

ISSUE	ISSUE DATE	VALIDITY (YEARS)	EXPIRY DATE	AUTHORISING ENGINEER'S SIGNATURE
FIRST ISSUE				
FIRST REVIEW				
SECOND REVIEW				
THIRD REVIEW				

NOTES:



Establishment Commanding Officer,
Director or Head of Establishment

Full postal address including the post code.
Telephone code & number.

Works Services Manager
(full address)

Your reference:

Our reference:

Date:

APPOINTMENT OF AUTHORISING ENGINEER PETROLEUM

I confirm the appointment of _[_n_a_m_e_]_ as the Authorising Engineer Petroleum for
_[_e_s_t_a_b_l_i_s_h_m_e_n_t_]_ from _[_d_a_t_e_]_ for three years.

The areas and sites of responsibility specific to this appointment are:

- 1
- 2
- 3
- 4
- :
- :

To accept this appointment please sign, date, and return the attached copy to me .

Name of Establishment Commanding Officer,
Director or Head of Establishment.

Copy to:

DEO(Works) - HQ - TSD - Petroleum Technical Authority
MOD Contracts Branch for Works Services
DEO(Works) - HQ - CSD

Appendix 2 Principal petroleum products

For further details of the products listed below please refer to Defence Standard 01-5 (Reference 25).

Table A2,1 Petroleum product data

PRODUCT	JOINT SERVICES DESIGNATION	NATO CODE	NOTES
Class I — flash points below 21 degrees C. Gasoline, aviation (Grade 100/130) Gasoline, automotive unleaded (95RON) Gasoline, automotive military (96RON)	AVGAS 110LL ULGAS MTGAS	F-18 F-67 F-57	Highly toxic, leaded and containing benzene
Class II — Flash points in the range 21-55 degrees C inclusive. Turbine fuel, aviation (kerosene type with fuel system icing inhibitor) Turbine fuel, aviation (kerosene type) Kerosene (Grade A) (BS 2869 Pt 2 Class C1) Kerosene (Grade B) (BS 2869 Pt 2 Class C2)	AVTUR/FSII AVTUR KERO/A KERO/B	F-34 F-35 — F-58	FSII highly toxic
Class III — Flash points above 55 and up to 100 degrees C. Turbine fuel, Aviation, high flash type (with fuel system icing inhibitor) Turbine fuel, Aviation, high flash type Naval distillate Diesel fuel, military	AVCAT/FSII AVCAT DIESO DIESO MILITARY	F-44 F-43 F-76 F-54	FSII highly toxic

Table A2.1 Continued

PRODUCT	JOINT SERVICES DESIGNATION	NATO CODE	NOTES
Diesel fuel, general purpose MT (BS 2869 Class A1)	GENERAL PURPOSE UK MT DIESO	—	
Diesel fuel, general purpose MT (BS 2869 Class A2)	GENERAL PURPOSE UK DIESO	—	
Fuel, residual, light viscosity	50/50 FFO	F-77	
Fuel, residual, medium viscosity	75/50 FFO	—	
<i>The following are to BS 2869: 1988 Part 2</i>			
Fuel, burner distillate: Class D	3/50 FFO	—	
Fuel, residual: Boiler, Class E	36/50 FFO	—	
Fuel, residual: Boiler, Class F	125/50 FFO	—	
Fuel, residual: Boiler, Class G	370/50 FFO	—	

Notes:

1. The classification of other petroleum products stored at MOD installations is contained in JSP 317.
2. The supplier of other petroleum products must confirm the flash point in writing.
3. When a higher flash point product is contaminated by a lower flash point product, the resulting mixture is to be classified as the lower flash point component, unless laboratory tests confirmed in writing indicate otherwise.

Appendix 3 Minimum safety distances when setting up restricted areas

The minimum safety distance should be measured from the potential source of release of petroleum product. Where a spillage risk exists, the minimum safety distance should be measured from the edge of the potential spillage area.

Table A3.1 Petroleum product data

OPERATING AUTHORITY	CLASS I PRODUCT	CLASS II PRODUCT	KERBSIDE PUMP INSTALLATION CLASS I PRODUCT
MOD Source	15 metres JSP317	6 metres JSP 317	4.25 metres JSP 317
USAF in UK Source	100ft Aviation fuel, Reference AFM 85-16 25ft Other fuels, reference NF code	25ft flashpoint 22.8 to 37.8 degree C 15ft Flashpoint 37.8 to 60 degree C Above 60 degree C, as Class HI	20ft Reference AF88-12

References:

JSP 317 MOD Joint Services Regulations for the Storage and Handling of Petroleum Products

AFM US Air Force Manual

NF US National Fire Code, Volume 1

Appendix 4 Permits to work petroleum and related documents

The following documents are contained in this Appendix:

- A4.1 Typical questionnaire to aid Authorised Person Petroleum assessment of the competence of the Person in Charge to conduct Hazardous Area Works.
- A4.2 Example of the co-ordination of works.
- A4.3 Notification List of Hazardous Area Works which do not require Permit to Work Petroleum Restricted Area:
 - a. Original.
 - b. Copy to be retained in the permit book.
- A4.4 Permit to Work Petroleum Hazardous Area:
 - a. Original.
 - b. Copy to be retained in the permit book.
- A4.5 Gas Free Certificate (Refer to Section 6.14.5):
 - a. Original.
 - b. Copy to be retained in the permit book
- A4.6 OA Authorisation for Permit to Work Petroleum Restricted area:
 - a. Original.
 - b. Copy to be retained in the permit book.
- A4.7 Permit to Work Petroleum Restricted area:
 - a. Original.
 - b. Copy to be retained in the permit book.
- A4.8 Safety Plan

A4.1 - TYPICAL QUESTIONNAIRE TO AID THE AUTHORISED PERSON PETROLEUM ASSESSMENT OF THE COMPETENCE OF THE PERSON IN CHARGE TO CONDUCT HAZARDOUS AREA WORKS

1	Are petroleum operations allowed to continue whilst works controlled by Hazardous Area permits are in progress?	
2	What forms of petroleum release can occur when an installation is operated?	
3	Is smoking allowed in the Hazardous Area?	
4	Is the consumption of food and drinks allowed in a Hazardous Area?	
5	What are the main risks at a petroleum installation?	
6	What kind of footwear must not be allowed in the Hazardous Area?	
7	Why is the changing of clothing prohibited within a Hazardous Area?	
8	What action do you take in an emergency?	
9	If you are working in a mechanically ventilated area and the ventilation fails, what action do you take?	
10	During your job, a need arises for a task which is not included in your work specification or permit. What action do you take?	

A4.2 - EXAMPLE OF THE CO-ORDINATION OF WORKS

The Authorised Person Petroleum is the focal point for the planning, identification and control of maintenance works risks. The Operating Authority is responsible for ensuring that permits are co-ordinated, and that petroleum and base wide operations are fully taken into account before the Authorised Person Petroleum is given authority to issue permits. This example is for the setting up of a Restricted Area. The following chart should be entered at the Authorised Person Petroleum column, with the downward flow showing the time sequence of events and contact with the various organisations:

BASE SAFETY CO-ORDINATION OF OPERATIONS AND WORKS	OPERATING AUTHORITY E.G. OFFICER IN CHARGE OF THE PETROLEUM INSTALLATION	AUTHORISED PERSON PETROLEUM - USUALLY AN EMPLOYEE OF THE WORKS SERVICES MANAGEMENT ORGANISATION	PERSON IN CHARGE OF THE WORKS TASK USUALLY A WORKS SERVICES MANAGER CONTRACTOR OR SUB-CONTRACTOR
		1. Receives requests for works including input from the planned maintenance system.	
		2. Plans works jobs in detail and completes risk assessment.	
		3. Decides from risk assessment whether a Restricted Area is required. <i>Examples of Restricted Areas include jobs requiring tank entry or release of product.</i>	
	1. Checks plans against petroleum operational requirements.	4. Co-ordinates works plans with Operating Authority.	
1. Checks influences of Base operations on job, and job on operations for Restricted Area work.	2. For Restricted Area work, co-ordinates plans at Base/Establishment level for acceptability, and safety influence on operations.		
2. Authorises Operating Authority to proceed.	3. Authorises Authorised Person Petroleum to raise Permit to Work Petroleum Restricted Area.		
	4. Directs supervision and staff at the installation in question to cease petroleum operations when Authorised Person Petroleum sets up the Restricted Area.		
		5. Sets up Restricted Area.	
		6. Raises Permit to Work Petroleum Restricted Area to Work for the first stage of the job, checks the competence of the contractor/sub-contractor team, and obtains Person in Charge's signature on permit.	1. Accepts Permit to Work Petroleum Restricted Area and conducts the stage of the job covered by the permit fully in accordance with the MOD Safety Rules and Procedures.

Ministry of Defence DEO (Works)	A4.3a - NOTIFICATION LIST - HAZARDOUS AREA WORKS WHICH DO NOT REQUIRE PERMIT TO WORK PETROLEUM RESTRICTED AREA <u>ORIGINAL</u>	Permit Book No _____ Permit Serial No _____			
Maintenance Organisation _____					
This Permit is not valid until it has been signed by the Operating Authority and the Authorised Person Petroleum					
1. Establishment					
Ref	Location	Date/Time/Duration	Brief Job description	Permission	Work Completed
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
2. Comments		Ref No () Ref No () Ref No () Ref No ()			
3. As Operating Authority I declare that the above mentioned authorised jobs can be carried out provided that the MOD Safety Rules and Procedures are implemented and that where permits are necessary to comply with the MOD Safety Rules and Procedures, they are authorised by the Authorised Person Petroleum and agreed by the Person in Charge					
Signed	Operating Authority		Time/Date	(hrs) / /	
4. As Authorised Person Petroleum I confirm that all works will be carried out in accordance with the MOD Safety Rules and Procedures. Hazardous Area Permits required will be raised and agreed by the Person in Charge					
Signed	Authorised Person Petroleum		Time/Date	(hrs) / /	
Notes <ol style="list-style-type: none"> The list is prepared by the Authorised Person Petroleum and presented to the Operating Authority for review and to gain permission for the tasks, all of which can be accomplished whilst the petroleum facilities are operated normally. Permission may not be granted for all tasks on the list. The frequency of presentation of lists depends on the size of the petroleum facility and the number of tasks, and suitable local arrangements must be made. It is important to note that the potential exists for jobs of differing durations to be found on the same list. Permission is given by the Operating Authority for the duration/time/dates notified for each job. Permission must not be assumed for other times. If a job is to be extended or rescheduled, this must be covered in advance by a further notification list. The Authorised Person Petroleum retains the book copy. Note that the book copy giving the authority to the Authorised Person Petroleum to raise permits must include the original Operating Authority signature. The Operating Authority is required to display his copy at the control room/office, whilst there are jobs with outstanding valid permission. This may mean that more than one list must be displayed at the same time. When the list is no longer valid, it should be filed. When the work has been completed, the connected Hazardous Area Permit will be returned to the Operating Authority to update the Notification List. The Hazardous Area Permit will then be destroyed or filed according to local procedures. 					

Ministry of Defence DEO (Works)		A4.3b - NOTIFICATION LIST - HAZARDOUS AREA WORKS WHICH DO NOT REQUIRE PERMIT TO WORK PETROLEUM RESTRICTED AREAS <u>COPY TO BE RETAINED IN BOOK</u>			Permit Book No _____ Permit Serial No _____
Maintenance Organisation _____					
This Permit is not valid until it has been signed by the Operating Authority and the Authorised Person Petroleum					
1 Establishment					
Ref	Location	Date/Time/Duration	Brief Job description	Permission	Work Completed
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
2 Comments		Ref No () Ref No () Ref No () Ref No ()			
3. As Operating Authority I declare that the above mentioned authorised jobs can be carried out provided that the MOD Safety Rules and Procedures are implemented and that where permits are necessary to comply with the MOD Safety Rules and Procedures, they are authorised by the Authorised Person Petroleum and agreed by the Person in Charge					
Signed	Operating Authority		Time/Date	(hrs) / /	
4. As Authorised Person Petroleum I confirm that all works will be carried out in accordance with the MOD Safety Rules and Procedures. Hazardous Area Permits required will be raised and agreed by the Person in Charge					
Signed	Authorised Person Petroleum		Time/Date	(hrs) / /	
Notes <ol style="list-style-type: none"> The list is prepared by the Authorised Person Petroleum and presented to the Operating Authority for review and to gain permission for the tasks, all of which can be accomplished whilst the Petroleum facilities are operated normally. Permission may not be granted for all tasks on the list. The frequency of presentation of lists depends on the size of the petroleum facility and the number of tasks, and suitable local arrangements must be made. It is important to note that the potential exists for jobs of differing durations to be found on the same list. Permission is given by the Operating Authority for the duration/time/dates notified for each job. Permission must not be assumed for other times. If a job is to be extended or rescheduled, this must be covered in advance by a further notification list. The Authorised Person Petroleum retains the book copy. Note that the book copy giving the authority to the Authorised Person Petroleum to raise permits must include the original Operating Authority signature. The Operating Authority is required to display his copy at the control room/office, whilst there are jobs with outstanding valid permission. This may mean that more than one list must be displayed at the same time. When the list is no longer valid, it should be filed. When the work has been completed, the connected Hazardous Area Permit will be returned to the Operating Authority to update the Notification List. The Hazardous Area Permit will then be destroyed or filed according to local procedures. 					

Ministry of Defence Defence Estate Organisation (Works)		A4.4a - PERMIT TO WORK PETROLEUM - HAZARDOUS AREAS <u>ORIGINAL</u>				Permit Book No _____ Permit Serial No _____	
Maintenance Organisation _____							
This Permit is not valid until parts I and II have been signed							
PART I * Delete as appropriate							
1. Establishment							
Installation						Equipment Identity No	
2. Validity	From	(hrs)	Date	To	(hrs)	Date	
3. Product Handled				Class		Leaded/Highly Toxic/Lead Free *	
4. Description of Work to be Authorised							
5. Reference Permits/Notification List/Certificates							
6. Emergency Contact		Authorised Person Petroleum	Mr	Tel			
Operating Authority		Mr Tel					
Fire	Tel	Medical	Tel	Works Services Manager	Tel		
7. As Authorised Person Petroleum I hereby declare that it is safe to carry out the work authorised above subject to compliance with the MOD Safety Rules and Procedures for Hazardous Areas. I have drawn the attention of the Person in Charge to these Rules and Procedures and Poster							
Signed	Authorised Person Petroleum			Time/Date	(hrs)	/	/

PART II							
As Person in Charge I acknowledge receipt of the Permit and declare that I am in charge of the work authorised in Part I above. I declare that no attempt will be made by me or by the men under my control to carry out any work not authorised in this Permit and the work authorised will be carried out in accordance with the MOD Safety Rules and Procedures.							
Signed	Person in Charge			Time/Date	(hrs)	/	/
In the employ of							

<p>Notes</p> <p>1. The Authorised Person Petroleum is to:</p> <p>a. Fill in and sign Part I of the Original, and the book copy. The Authorised Person Petroleum retains the book copy, and hands the original to the P in C</p> <p>b. Cancel the Original when Part III of the book copy covering the return of the original has been signed, and forward the cancelled copy of the original to the Operating Authority</p> <p>c. Sign Part IV retained in the book covering Cancellation of the Permit to confirm that the action detailed in para 1.b above has been taken</p>	<p>2. The Person in Charge is to:</p> <p>a. Acknowledge receipt of the Permit by signing Part II of the Original and Part II of the book copy</p> <p>b. Retain the Original while work is in progress</p> <p>c. Return the Original when the work is complete/suspended and sign Part III retained in the book covering Return of Permits</p>
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Ministry of Defence Defence Estate Organisation (Works)		A4.4b - PERMIT TO WORK PETROLEUM - HAZARDOUS AREAS <u>COPY TO BE RETAINED IN BOOK</u>				Permit Book No _____ Permit Serial No _____	
Maintenance Organisation _____							
This Permit is not valid until parts I and II have been signed							
PART I * Delete as appropriate							
1. Establishment							
Installation						Equipment Identity No	
2. Validity	From	(hrs)	Date	To	(hrs)	Date	
3. Product Handled				Class	Leaded/Highly Toxic/Lead Free *		
4. Description of Work to be Authorised							
5. Reference Permits/Notification List/Certificates							
6. Emergency Contact		Authorised Person Petroleum	Mr	Tel			
Operating Authority		Mr			Tel		
Fire	Tel	Medical	Tel	Works Services Manager	Tel		
7. As Authorised Person Petroleum I hereby declare that it is safe to carry out the work authorised above subject to compliance with the MOD Safety Rules and Procedures for Hazardous Areas. I have drawn the attention of the Person in Charge to these Rules and Procedures and Poster							
Signed	Authorised Person Petroleum			Time/Date	(hrs)	/	/

PART II							
As Person in Charge I acknowledge receipt of the Permit and declare that I am in charge of the work authorised in Part I above. I declare that no attempt will be made by me or by the men under my control to carry out any work not authorised in this Permit and the work authorised will be carried out in accordance with the MOD Safety Rules and Procedures.							
Signed	Person In Charge			Time/Date	(hrs)	/	/
In the employ of							

PART III - Return of Permit							
As Person in Charge I hereby declare that the work detailed in Part I of this Permit has been completed/suspended* and that all men in my charge have been warned that it is no longer safe to work on the equipment specified in the Permit							
Signed	Person in Charge			Time/Date	(hrs)	/	/

PART IV - Cancellation of Permit							
As Authorised Person Petroleum I hereby declare that this Permit is cancelled.							
Signed	Authorised Person Petroleum			Time/Date	(hrs)	/	/
Notes 1. The Authorised Person Petroleum is to : a. Fill in and sign Part I of the Original, and the book copy. The Authorised Person Petroleum retains the book copy, and hands the original to the P Person in Charge b. Cancel the Original when Part III of the book copy covering the return of the original has been signed, and forward the cancelled copy of the original to the Operating Authority c. Sign Part IV retained in the book covering Cancellation of the Permit to confirm that the action detailed in para 1.b above has been taken				2. The Person in Charge is to: a. Acknowledge receipt of the Permit by signing Part II of the Original and Part II of the book copy b. Retain the Original while work is in progress c. Return the Original when the work is complete/suspended and sign Part III retained in the book covering Return of Permits			

Ministry of Defence
Defence Estate Organisation (Works)

Permit Book No _____
Permit Serial No _____

A4.5a GAS TEST CERTIFICATE ORIGINAL

Part I

1. Establishment			
Installation			
2. Certificate to be used for gas tests to enable electrical equipment to be proved dead			
3. Gas reading	% of LEL	Time Date	(hrs) / /
4. As AP PET I certify that the immediate vicinity of the equipment to be proved dead is safe for the test to be made and that I will continuously monitor the gas level until the work is complete			
Signed	AP PET	Time Date	(hrs) / /

Part II - Cancellation of Permit

As AP PET I confirm that the tests are complete			
Signed	AP PET	Time Date	(hrs) / /

Ministry of Defence
Defence Estate Organisation (Works)

Permit Book No _____
Permit Serial No _____

A4.5b GAS TEST CERTIFICATE COPY TO BE RETAINED IN BOOK

Part I

1. Establishment			
Installation			
2. Certificate to be used for gas tests to enable electrical equipment to be proved dead			
3. Gas reading	% of LEL	Time Date	(hrs) / /
4. As AP PET I certify that the immediate vicinity of the equipment to be proved dead is safe for the test to be made and that I will continuously monitor the gas level until the work is complete			
Signed	AP PET	Time Date	(hrs) / /

Part II - Cancellation of Permit

As AP PET I confirm that the tests are complete			
Signed	AP PET	Time Date	(hrs) / /

Ministry of Defence DEO(Works)		A4.6a - OPERATING AUTHORITY AUTHORISATION FOR PERMIT TO WORK PETROLEUM RESTRICTED AREA TO BE RAISED <u>ORIGINAL</u>				Permit Book No _____ Permit Serial No _____	
Maintenance Organisation _____							
This Authorisation Permit is not valid until Part I has been signed by the Operating Authority and the Authorised Person Petroleum							
PART I		* Delete as appropriate					
1. Establishment							
Installation						Equipment Identity No	
2. Validity	From	(hrs)	Date	To	(hrs)	Date	
3. Product Handled				Class	Leaded/Highly Toxic/Lead Free *		
4. Description of Work to be Authorised							
5. Reference Permits							
6. Operational Consequences (Petroleum Operations)							
7. Operational Consequences (General Operations)							
8. As Operating Authority I declare that the work can be carried out provided that the MOD Safety Rules and Procedures are implemented and that the permits are authorised by the Authorised Person Petroleum and agreed by the Person in Charge							
Signed	Operating Authority			Time/Date	(hrs)	/	/
9. As the Authorised Person Petroleum I confirm that the Restricted Area Permits will be raised and agreed by the Person in Charge, and that all works will be carried out in accordance with the MOD Safety Rules and Procedures							
Signed	Authorised Person Petroleum			Time/Date	(hrs)	/	/
PART II - Cancellation of Permit							
As Authorised Person Petroleum I confirm that the works are complete, that I have inspected the area, and that the installation is now returned to the Operating Authority for normal use							
Signed	Authorised Person Petroleum			Time/Date	(hrs)	/	/
Notes 1. Restricted Area permits apply to hazardous work in hazardous areas. 2. Paragraphs 1 to 4 are to be completed by the Authorised Person Petroleum. The Description of Work must cover the full range of component tasks to enable the Authorised Person Petroleum to raise a consecutive sequence of permits to cover the whole works. 3. The Operating Authority then completes paragraphs 5 to 7. 4. A copy may be forwarded to the management centre of the establishment for authority to go ahead. This depends upon local procedures. 5. When the establishment authority has been obtained, local requirements met, and any Reference Permits added, the Operating Authority and the Authorised Person Petroleum sign the form. 6. The Operating Authority copy of the permit is displayed in the control room or recognised management centre for Petroleum Operations. 7. A further copy may be forwarded to the management centre of the establishment, depending on local rules. 8. At the end of the works the Authorised Person Petroleum completes Part II on the book copy, and also the Operating Authority copy. 9. When an establishment copy is used, the Operating Authority must make local arrangements for the return of that copy after the completion of the works.							

Ministry of Defence DEO(Works)		A4.6b - OPERATING AUTHORITY AUTHORISATION FOR PERMIT TO WORK PETROLEUM RESTRICTED AREA TO BE RAISED <u>COPY TO BE RETAINED IN THE BOOK</u>				Permit Book No _____ Permit Serial No _____	
Maintenance Organisation _____							
This Authorisation Permit is not valid until Part I has been signed by the Operating Authority and the Authorised Person Petroleum							
PART I * Delete as appropriate							
1. Establishment							
Installation						Equipment Identity No _____	
2. Validity		From	(hrs)	Date	To	(hrs)	Date
3. Product Handled					Class	Leaded/Highly Toxic/Lead Free *	
4. Description of Work to be Authorised							
5. Reference Permits							
6. Operational Consequences (Petroleum Operations)							
7. Operational Consequences (General Operations)							
8. As Operating Authority I declare that the work can be carried out provided that the MOD Safety Rules and Procedures are implemented and that the permits are authorised by the Authorised Person Petroleum and agreed by the Person in Charge							
Signed	Operating Authority				Time/Date	(hrs)	/ /
9. As the Authorised Person Petroleum I confirm that the Restricted Area Permits will be raised and agreed by the Person in Charge, and that all works will be carried out in accordance with the MOD SAFETY Rules and Procedures							
Signed	Authorised Person Petroleum				Time/Date	(hrs)	/ /
PART II - Cancellation of Permit							
As Authorised Person Petroleum I confirm that the works are complete, that I have inspected the area, and that the installation is now returned to the Operating Authority for normal use							
Signed	Authorised Person Petroleum				Time/Date	(hrs)	/ /
Notes 1. Restricted Area permits apply to hazardous work in hazardous areas. 2. Paragraphs 1 to 4 are to be completed by the Authorised Person Petroleum. The Description of Work must cover the full range of component tasks to enable the Authorised Person Petroleum to raise a consecutive sequence of permits to cover the whole works. 3. The Operating Authority then completes paragraphs 5 to 7. 4. A copy may be forwarded to the management centre of the establishment for authority to go ahead. This depends upon local procedures. 5. When the establishment authority has been obtained, local requirements met, and any Reference Permits added, the Operating Authority and the Authorised Person Petroleum sign the form. 6. The Operating Authority copy of the permit is displayed in the control room or recognised management centre for Petroleum Operations. 7. A further copy may be forwarded to the management centre of the establishment, depending on local rules. 8. At the end of the works the Authorised Person Petroleum completes Part II on the book copy, and also the Operating Authority copy. 9. When an establishment copy is used, the Operating Authority must make local arrangements for the return of that copy after the completion of the works.							

Ministry of Defence Defence Estate Organisation (Works)		A4.7a - PERMIT TO WORK PETROLEUM - RESTRICTED AREA <u>ORIGINAL</u>				Permit Book No _____ Permit Serial No _____	
Maintenance Organisation _____							
This Permit is not valid until Part I has been signed by the AP Petroleum and the Personal in Charge.							
* Delete as appropriate				** Delete if work confined to grass cutting			
PART I		MAXIMUM VALIDITY IS 5 DAYS - TO BE RENEWED DAILY					
1. Establishment							
Installation						Equipment Identity No	
2. Initial Validity	From	(hrs)	Date	To	(hrs)	Date	
3. Product Handled			Class		Leaded/Highly Toxic/Lead Free *		
4. Description of Work to be Authorised							
5. Reference Permits							
6. Operational Consequences (Petroleum Operations)							
7.** Ventilation requirements for work							
8.** Breathing Apparatus required	Yes/No*	Grade		Personal Protective Equipment required	Yes/No*	Grade	
** Additional Safety Equipment required	Yes/No*	Detail:					
9. Maximum Permissible Gas Concentration		% Lower Explosive Limit		10.** Permissible Oxygen levels, MIN 19% MAX 22%			
11.** Joint Safety Checks (Answer YES, NO or N/A)							
a. Have warning signs been placed ?				b. Is Restricted Area clearly marked ?			
c. Have drains and sewers within the safety distance been sealed ?				d. Has combustible material been cleared ?			
e. Has fire fighting equipment been placed ?				f. Is electrical/welding equipment safely placed ?			
g. Are diesel engines and air compressors correctly sited?				h. Has plant/equipment been isolated from: (1) Electrical power ? (2) Mechanical power ?			
i. Has cathodic protection been switched off and disconnected for sufficient time ?				j. Is earthing/bonding correctly applied ?			
k. Has the wind direction been considered ?				l. Has tank/confined space been drained ?			
m. Has tank/confined space been isolated by: (1) Blanking? (2) Capping? (3) Plugging?				n. Has tank/confined space been ventilated by: (1) Natural means? (2) Mechanical means?			
o. Has the interior of the tank been cleaned: (1) to bare metal? (2) Of all sludge and loose scale?							

A4.7a - PART I - CONTINUED

12. Initial Combustible Gas Test	% LEL	For max permissible level see para 9. (Repeat tests are to be entered in the results table)			
13. For confined space entry only Initial Oxygen Percentage tests	%	For permissible limits see para 10. (Repeat tests are to be entered in the results table)			
14. Additional Potential Hazards					
15. Additional Precautions					
16. Emergency Contacts	Authorised Person Petroleum	Mr	Tel		
Operating Authority	Mr	Tel			
Fire	Tel	Medical	Tel	Works Services Manager	Tel
17. As the Authorised Person Petroleum I hereby declare that I have carried out the safety checks detailed in Part I of this permit, initial combustible and oxygen tests with the Person in Charge and define that is safe to carry out the work authorised in accordance with the MOD Safety Rules and Procedures for Restricted Areas, subject to these conditions being maintained. I have drawn the attention of the P in C to the MOD Safety Rules and Procedures and Poster					
Signed	Authorised Person Petroleum		Time/Date	(hrs) / /	

PART II

18. As Person in Charge I acknowledge receipt of this permit and declare that I am in charge of the works authorised in part I above. I have carried out the safety checks detailed in Part I, initial combustible gas and oxygen percentage tests with the Authorised Person Petroleum. I declare that no attempt will be made by me or men under my control to carry out any work not authorised on the Permit and the work authorised will be carried out in accordance with the MOD Safety Rules and Procedures			
Signed	P in C	Time/Date	(hrs) / /

THIS PERMIT IS RENEWED				RE AFFIRMATION OF PART I	
From		To		Section 17	Section 18
Time	Date	Time	Date	Signature of Authorised Person Petroleum	Signature of Person in Charge

Notes 1. The Authorised Person Petroleum is to : a. Fill in and sign Part I of the Original, and the book copy. The Authorised Person Petroleum retains the book copy, and hands the original to the Person in Charge b. Record and sign for repeat tests c. Destroy the Original when Part III of the book copy covering the return of the original has been signed d. Sign Part IV retained in the book covering Cancellation of the Permit to confirm that the action detailed in para 1.c above has been taken	2. The P in C is to : a. Acknowledge receipt of the Permit by signing Part II of the Original and Part II of the book copy b. Retain the Original while work is proceeding c. Record and sign for results of repeat and intermediate tests on the reverse of this sheet d. Return the Original when the work is complete/suspended and sign Part III retained in the book covering Return of Permits
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A4.7a - Results of Combustible Gas/Oxygen Percentage Tests

Repeat Test	Time	Date	Gas % Level	Oxygen % Level	Authorised Person Petroleum Signature Person in Charge Signature
Test 1					
Test 2					
Test 3					
Test 4					
Test 5					
Test 6					
Test 7					
Test 8					
Test 9					
Test 10					
Test 11					
Test 12					
Test 13					
Test 14					
Test 15					
Test 16					
Test 17					
Test 18					

Intentionally blank

Ministry of Defence Defence Estate Organisation (Works)		A4.7b - PERMIT TO WORK PETROLEUM - RESTRICTED AREA <u>COPY TO BE RETAINED IN BOOK</u>				Permit Book No _____ Permit Serial No _____	
Maintenance Organisation _____							
This Authorisation Permit is not valid until Part I has been signed by the AP Petroleum and the Person in Charge.							
* Delete as appropriate				** Delete if work confined to grass cutting			
PART I		MAXIMUM VALIDITY 5 DAYS - TO BE RENEWED DAILY					
1. Establishment							
Installation						Equipment Identity No	
2. Initial Validity	From	(hrs)	Date	To	(hrs)	Date	
3. Product Handled			Class			Leaded/Highly Toxic/Lead Free *	
4. Description of Work to be Authorised							
5. Reference Permits							
6. Operational Consequences (Petroleum Operations)							
7.** Ventilation requirements for work							
8.** Breathing Apparatus required	Yes/No*	Grade		Personal Protective Equipment required	Yes/No*	Grade	
** Additional Safety Equipment required	Yes/No*	Detail:					
9. Maximum Permissible Gas Concentration		% Lower Explosive Limit		10.** Permissible Oxygen levels, MIN 19% MAX 22%			
11.** Joint Safety Checks (Answer YES, NO or N/A)							
a. Have warning signs been placed ?				b. Is Restricted Area clearly marked ?			
c. Have drains and sewers within the safety distance been sealed ?				d. Has combustible material been cleared ?			
e. Has fire fighting equipment been placed ?				f. Is electrical/welding equipment safely placed ?			
g. Are diesel engines and air compressors correctly sited?				h. Has plant/equipment been isolated from: (1) Electrical power ? (2) Mechanical power ?			
i. Has cathodic protection been switched off and disconnected for sufficient time ?				j. Is earthing/bonding correctly applied ?			
k. Has the wind direction been considered ?				l. Has tank/confined space been drained ?			
m. Has tank/confined space been isolated by: (1) Blanking? (2) Capping? (3) Plugging?				n. Has tank/confined space been ventilated by: (1) Natural means? (2) Mechanical means?			
o. Has the interior of the tank been cleaned: (1) to bare metal? (2) Of all sludge and loose scale?							

A4.7b - PART I - CONTINUED

12. Initial Combustible Gas Test	% LEL	For max permissible level see para 9. (Repeat tests are to be entered in the results table)			
13. For confined space entry only Initial Oxygen Percentage tests	%	For permissible limits see para 10. (Repeat tests are to be entered in the results table)			
14. Additional Potential Hazards					
15. Additional Precautions					
16. Emergency Contacts	Authorised Person Petroleum	Mr	Tel		
Operating Authority	Mr	Tel			
Fire	Tel	Medical	Tel	Works Services Manager	Tel
17. As the Authorised Person Petroleum I hereby declare that I have carried out the safety checks detailed in Part I of this permit, initial combustible and oxygen tests with the Person in charge and define that is safe to carry out the work authorised in accordance with the MOD Safety Rules and Procedures for Restricted Areas, subject to these conditions being maintained. I have drawn the attention of the Person in Charge to the MOD Safety Rules and Procedures and Poster					
Signed	Authorised Person Petroleum		Time/Date	(hrs) / /	

PART II

18. As Person in Charge I acknowledge receipt of this permit and declare that I am in charge of the works authorised in Part I above. I have carried out the safety checks detailed in Part I, initial combustible gas and oxygen percentage tests with the Authorised Person Petroleum. I declare that no attempt will be made by me or men under my control to carry out any work not authorised on the Permit and the work authorised will be carried out in accordance with the MOD Safety Rules and Procedures					
Signed	P in C		Time/Date	(hrs) / /	

THIS PERMIT IS RENEWED				RE AFFIRMATION OF PART I	
From		To		Section 17	Section 18
Time	Date	Time	Date	Signature of Authorised Person Petroleum	Signature of Person in Charge

PART III - Return of Permit

As P in C I hereby declare that the work detailed in Part I of this Permit has been completed/suspended* and that all men in my charge have been warned that it is no longer safe to work on the equipment specified in the Permit					
Signed	P in C		Time/Date	(hrs) / /	

PART IV - Cancellation of Permit

As Authorised Person Petroleum I hereby declare that this Permit is cancelled and					
Notes			2. The P in C is to :		
1. The Authorised Person Petroleum is to :					
a. Fill in and sign Part I of the Original, and the book copy. The Authorised Person Petroleum retains the book copy, and hands the original to the Person in Charge.			a. Acknowledge receipt of the Permit by signing Part II of the Original and Part II of the book copy		
b. Record and sign for repeat tests			b. Retain the Original while work is proceeding		
c. Destroy the Original when Part III of the book copy covering the return of the original has been signed			c. Record and sign for results of repeat and intermediate tests on the reverse of this sheet		
d. Sign Part IV retained in the book covering Cancellation of the Permit to confirm that the action detailed in para 1.c above has been taken			d. Return the Original when the work is complete/suspended and sign Part III retained in the book covering Return of Permit		

Rear of A4.7b

Results of Combustible Gas/Oxygen Percentage Tests

Repeat Test	Time	Date	Gas % Level	Oxygen % Level	Authorised Person(PET) Signature P in C Signature
Test 1					
Test 2					
Test 3					
Test 4					
Test 5					
Test 6					
Test 7					
Test 8					
Test 9					
Test 10					
Test 11					
Test 12					
Test 13					
Test 14					
Test 15					
Test 16					
Test 17					
Test 18					

A4.8 SAFETY PLAN	Sheet.....of.....
Prepared by:	Date.....
Location of job:	
Brief Job Description:	
Stage.....Starting conditions:	
Key safety factors: technical information - isolation - ignition risks - exposure risks - exposure time - confined space entry - petroleum release - other - <i>Sketch the work area, the location of work, isolation details, equipment location, then define the risks associated with the stage of the job under evaluation</i>	
Risks and solutions:	
End conditions:	
Permit type:	
More detail will be required for safety and technical reasons for certain jobs. This should be provided in a Method Statement or Technical Specification.	

Appendix 5 Health precautions for staff working on petroleum installations

In view of the minimal risk of exposure to tetra-ethyl lead by Government Employees because of the nature of their duties such as tank entry, which are performed at infrequent intervals, (as opposed to contractors who may be regularly exposed because of their work for MOD and others), there is no need for a formal system of health monitoring. According to the Control of Lead at Work Regulations 1980, medical surveillance is only required if the exposure to lead is "significant" (Regulation 16). The Approved Code of Practice issued with the regulations defines significant exposure as "... risk of skin contact with concentrated lead alkyls" (para A5.10(c)). Provided correct Personal Protective Equipment is worn the risk is negligible.

The reason for medical fitness for the wearing of Respiratory Protective Equipment is defined in Section 8.

The advice to doctors carrying out examinations on those who are required to use Respiratory Protective Equipment and wear Personal Protective Equipment to eliminate exposure to toxic substances should include:

- a. examination of the respiratory system (to exclude chronic respiratory disorders)
- b. examination of the cardiovascular system
- c. examination of the skin (to eliminate any chronic skin condition which may be aggravated by the wearing of Personal Protective Equipment).

Personnel who wear Respiratory Protective Equipment must be medically examined on an annual basis, and carry evidence of their medical clearance for checking prior to working.

The established approach, for MOD personnel, is to maintain a register of those who are medically fit for the tasks, and to issue a warning card prior to work requiring the use of Respiratory Protective Equipment, which must be carried for 7 days after completion of the task. In the event of illness subsequent to tank entry, the card is to be made available to the doctor attending.

When the card is issued, the staff are asked to sign a register to confirm that, to the best of their knowledge, they have been free from the complaints listed on the warning card.

MOD personnel are to be examined by a doctor, briefed by Section 8 and this Appendix. The examination is to be recorded on form CAB MED 60 (4/89) I, obtainable from:

Civil Service Occupational Health Service
18-20 Hill St
Edinburgh EH2 3NB

The results of the medical will be directed to the personnel department, who will inform the person, his line manager, and the Authorising Engineer, of the results. Any adverse result should be notified in the following terms:

- You recently underwent medical examination to determine whether you should be asked to undertake / continue to undertake certain work on petroleum installations.
- This does not necessarily imply any serious health defect, but if you are in any doubt, the OHS would, with your consent, be prepared to write to your own doctor explaining the reason for the decision.

The line manager must arrange for records of absence from work, complete with reasons, to be kept. Doubts about the medical suitability of personnel must be followed up with renewed medical examination. Where there are doubts about a person's fitness he must not be assigned to duties which require the wearing of Respiratory Protective Equipment. The Authorising Engineer is reminded that he is responsible for ensuring that personnel who perform such duties must be medically fit, as well as appropriately trained, experienced, and equipped.

Contractors in general, and tank cleaning contractors in particular, are reminded of their responsibilities for the occupational health of their employees, and must:

- Ensure that employees are medically fit to wear Respiratory Protective Equipment and Personal Protective Equipment.
- Provide appropriate schemes for health monitoring for employees who may be exposed to toxic substances.
- Provide employees with evidence of medical fitness.

Contractors are advised that specialist medical advice should be sought to establish the health monitoring needs and how they can be satisfied.

Appendix 6 Multiple gas indicators

A6.1 EQUIPMENT REQUIREMENTS FOR PETROLEUM GAS TESTING

A Multiple Gas Indicator used at an MOD petroleum installation is to be selected from petroleum industry standard equipment, with proven effective use in the industry in similar application areas. The equipment must be robust and suitable for use as a tool to aid maintenance operations, and not simply a laboratory type scientific instrument. The Multiple Gas Indicator must be portable. The multiple use indicator capable of monitoring oxygen and toxic gases can be both efficient and cost effective, and provides the ideal solution.

A6.2 PERFORMANCE REQUIREMENTS

- a. Modern Multiple Gas Indicators are constructed in accordance with:
 - BS EN 50014, 18, 19, 20 or 39 - Electrical apparatus for potentially explosive atmospheres
 - BS EN 50054 & 50057 - Electrical apparatus for the detection and measurement of combustible gases.
- b. The following features are considered to be a minimum requirement:
 - Visual and Audible alarm, (minimum 85 dBA @ 1m), at the following settings :
 - 1% Lower Explosive Limit
 - 4% Lower Explosive Limit
 - 20% Lower Explosive Limit

Note: Lower Explosive Limit setting shall be adjustable over the desired range via Multiple Gas Indicator key pad or PC/Laptop, access via user password.

- O2 display 0% to 25% (by volume)
 - O2 alarm at 19% and 22%
 - H2S alarm at 10 ppm.

- Calibration of Multiple Gas Indicators is most commonly undertaken using Methane or Pentane. It must be appreciated that when calibrating a Multiple Gas Indicator with a product other than that which is to be measured, eg calibration on Pentane whilst using indicator on AVTUR, then the multiplication by a factor will be required to obtain a correct reading for the product gas or vapour tested.

This correction factor should be programmed into the instrument. This eliminates the need for the operator to apply the correction factor manually to the indicated reading. The Multiple Gas Indicator should be set up prior to use taking due account of the calibration gas and the gas to be detected. Typical correction factors are given in Figure A6.1:

Figure A6.1 Typical correction factors for pellistor multiple gas indicators

Gas/Vapour	Multiplication Factor for Pentane	Multiplication Factor for Methane
Kerosene	1.4	2.8
Petrol	1.0	1.9
Benzine	1.1	1.9
LPG	1.1	2.1

Note: The correction factors may differ depending upon instrument / pellistor manufacturer. The above are given for guidance only and are 'typical'.

- Continuous monitoring of product.
- Sampling of the product vapour shall be from the atmosphere to the pellistor. Where remote sampling tubes are to be utilised, for example prior to tank entry, this can be either by hand aspirator or by electrical sampling pump. Manufacturers' recommendations on maximum allowable length of sampling tube and time for the sample to reach the Multiple Gas Indicator will be required.

Note: The length of sample tube will vary depending upon the product being measured eg Hydrocarbon, Oxygen, Hydrogen Sulfide. Manufacturers' recommendations must be applied. The type of remote sampling tube utilised must be resistant to absorption of the product being measured otherwise false readings will be obtained.

- 8 to 10 hours minimum battery supply (with flammable sensor enabled).
- Low level battery warning. (Normally 5% of battery life remaining eg ½ hr remaining).
- Data logging facility with down loading of data via a computer.
- Suitable minimum Ingress Protection (IP) IP55, eg IP 55 for the pellistor and IP 57 to 65 for the Multiple Gas Indicator.
- Hazardous environment rated Zone 1, EEx ias IIC T3 or T4 or marked to an equivalent or higher standard. (Because of the nature of operation of the hydrocarbon pellistor a Multiple Gas Indicator fitted with hydrocarbon pellistor will not be suitable for application in Zone 0 hazardous areas.)
- Confidence beep. (Normally every 30 seconds)

- Robust outer casing for Multiple Gas Indicator protection. (This also to prevent an indicator with a damaged casing being used in a hazardous area.)
- Backlit display
- Scale calibrated in % for Hydrocarbon Lower Explosive Limit, % Oxygen and ppm for Hydrogen Sulfide. Scale increasing in (.1) of unit.
- On switch on, the following messages on the instrument are recommended:

Date

Time

Due date for next calibration (The indicator should lock out if the calibration date has expired)

Battery life remaining. (This should be expressed as a percentage of the usable hours remaining).

Self diagnostics check (A desirable feature is a lock out alarm on sensor over saturation, toxic only).

Confirmation of Multiple Gas Indicator settings, acknowledgement required by the user. These include:

Calibration gas

Product which product indicator is set to detect

Lower Explosive Limit setting

- Pellistor shall be suitable for leaded product.
- c. The temperature range over which the instrument is required to operate should be specified to the manufacturer, who in return should state the operating range for his instrument.

Appendix 7 Further guidance notes on multiple gas detection

A7.1 INTRODUCTION

Combustible gas tests are required by the MOD Safety Rules and Procedures for any work in a Restricted Area and for grass cutting when internal combustion engine driven machines are used. References to sections which cover combustible gas testing include the following:

- a. Multiple Gas Tests - Section 6.2.6 and Table 6.1.
- b. Multiple Gas Limits - Section 6.4
- c. Recording of Multiple Gas Tests - Section 5.2
- d. Multiple Gas Indicators - Appendix 6.
- e. Guidance on setting up a Restricted Area - Appendix 8.

Multiple Gas Indicators must be maintained, calibrated and used, in accordance with a Quality Assurance System.

A7.1.1 General

Prior to use the Authorised Person Petroleum must check the Multiple Gas Indicator selected for use is fit for purpose. For example the :

- a. Overall condition acceptable eg no apparent damage, suitable for hazardous environment etc.
- b. Indicator is within calibration date
- c. Indicator has been calibrated on a suitable product and that a suitable correction factor has been applied, (see Appendix A.6.2 and Table A6.1).

Note: For example if a Multiple Gas Indicator used to detect AVTUR/FSII is calibrated on Pentane then the indicated Lower Explosive Limit will under read by a factor approximately 1.4 unless a suitable correction is applied. (This correction factor must be a function of the indicator and not an "in head" calculation by the operator.) If the same indicator was calibrated on Methane then this under reading factor would increase to 2.8. It is therefore essential that suitable correction factors are input into the indicator to ensure that an accurate readout is obtained.

- d. Required Lower Explosive Limit Alarm setting has been applied eg 1%, 4% or 20%

- e. Suitable remaining battery life for proposed task

The Multiple Gas Indicator must be response tested daily, prior to use either by the Authorised Person Petroleum or by the Person in Charge. If the indicator is response tested by the Person in Charge the Authorised Person Petroleum must witness this test.

If there is doubt over the suitability of the proposed Multiple Gas Indicator then an alternative indicator should be used.

A7.2 GAS TESTS FOR OPEN SPACE WORK

Gas tests are most frequently required in open spaces in Restricted Areas, for changing Filter Water Separator and Fuel Monitor Cartridges, and for other cold work exposing Class I and II petroleum products, for example, opening up pipelines or equipment. The need for hot work in open spaces in Restricted Areas occurs infrequently.

Gas tests should be taken at the location of the work and must include any low level locations such as drains, ducts, and excavations in the vicinity of the work.

Petroleum gases are heavier than air and in still air conditions, may linger in low locations, so the Permit to Work Petroleum Restricted Area requires that all drains and sewers within the normal safety distance are sealed and that wind direction is taken into consideration.

The MOD Safety Rules and Procedures require continuous gas tests by use of the indicator in its continuous monitoring mode, at the location of the hot work because of the increased hazard of hot work. The frequency of joint and individual gas tests by the Authorised Person Petroleum and the Person in Charge is increased for hot work.

A7.3 GAS TESTING CONFINED SPACES

A7.3.1 Before Entry

Gas tests must always be taken before initial and daily entry into confined spaces with the indicator outside of the confined space, using the aspirator and sample tube through a manhole to obtain readings.

A7.3.2 Inside confined spaces

If the tests in paragraph A7.3.1 are satisfactory, gas tests can be taken inside the tank (wearing Respiratory Protective Equipment and Personal Protective Equipment if required by the MOD Safety Rules and Procedures). The points to note when testing in confined spaces include:

- a. Gas tests made in confined spaces should always be taken after ventilation, but with any ventilation arrangements (e.g. fans), switched off. This will avoid the possibility of reading gas concentration only in the ventilated air stream. Tests should be taken in several locations in confined spaces and must include areas liable to have hazardous gas concentrations e.g. pipeline entries, drain sump and low bottom plate levels on tanks (internal fittings such as floating suction, swing arms and flame arrestors should have already been removed).
- b. Pockets of combustible gas can be trapped under rust patches especially on the bottom plates of tanks. Any such patches should be removed by safe methods and the areas included in the tests.

- c. Continuous combustible gas concentration monitoring is required for hot work in any confined space at the location of the work. An increased frequency of joint and individual tests by the Authorised Person Petroleum and Person in Charge is specified.
- d. On buried or mounded tanks, any access chambers, tunnels, and ancillaries to the tanks must always be included in the gas tests.

A7.4 GAS TESTS FOR GAS FREEING OPERATIONS

As other maintenance work is not allowed (any other petroleum operations/ activities are not allowed in any Restricted Area), the prime purpose of gas tests during gas freeing operations is to establish whether normal minimum safety distances to Restricted Area boundaries require extension. Reference should be made to Appendix 8 - Guidance to Restricted Areas. The aim is to achieve 1% of Lower Explosive Limit. Any area with a higher reading must be restricted.

If there is any wind, the tests to establish if a 1% of Lower Explosive Limit concentration exists should be made at the downwind boundary located at the usual safety distance from the confined space. If the required level is not attained at this position, tests further downwind must be made until this concentration is obtained. The Restricted Area boundary must be moved out to this radius downwind.

In still air conditions, tests must be made all round at the normal safety distance radius from the confined space and the Restricted Area boundary moved out if test results are not satisfactory.

The indicator should initially be located at the downwind boundary of the established Restricted Area in conditions where there is a wind. In still air conditions it should be located at the part of the Restricted Area boundary where the highest gas concentration readings were obtained. If prescribed simultaneous and individual tests taken by the Authorised Person Petroleum and the Person in Charge reveal higher gas concentrations at another part of the Restricted Area, the indicator should be moved to that position and the process repeated with subsequent tests.

A7.5 FALSE READINGS

There is a risk that false readings could be obtained:

- a. When the gas or vapour level exceeds the Lower Flammable Limit, a full scale meter reading of 100% LEL should be obtained. However, the possibility exists with certain instruments that the full scale reading is first obtained, followed by the return to a reading of zero. If an instrument with this characteristic is employed, the onus is then placed on the Approved Person Petroleum to be especially vigilant when taking the first reading, especially when there is anticipation of the presence of an explosive atmosphere.
- b. Lower than actual readings of explosive gas can be may be obtained in atmospheres which are deficient in oxygen.
- c. The use of the instrument to detect hydrogen sulfide, leaded gasoline products and sulfur can partially or totally poison the detector.

Appendix 8 Guidance on restricted areas

A8.1 DETERMINATION OF RESTRICTED AREAS

The extent of safety distances at different types of petroleum installation and the distances from uncontrolled areas, are clearly defined for Hazardous Areas depending on the class of petroleum product handled and the type of installation concerned. These distances are determined by the responsible Operating Authorities (Service Authorities) based on the Model Codes of Safe Practice for the Petroleum Industry prepared by the Institute of Petroleum, and included in JSP 317, Reference 21.

In Restricted Areas there may well be variables, depending upon the type of work carried out and the particular circumstances prevailing, that make it impractical in all cases to follow the same precise distances defined for the boundaries of Hazardous Areas. The extent of a Restricted Area requires individual interpretation on a case to case basis. The guidance given in this Appendix relates to the principal factors involved, and is intended to assist those responsible for determining the extent and any special requirements of a Restricted Area.

A8.2 DISPERSAL OF GAS

The dispersal of flammable gas in air, to the extent that it ceases to be flammable, must be considered in relation to sources of possible ignition. It is essential that all factors that may influence the assessment of a Restricted Area are fully examined to ensure that the likely simultaneous existence of flammable gas/air mixture, together with a source of ignition, can not occur. This can best be achieved by logical and progressive analysis taking into consideration all of the possible factors which may be involved.

A8.3 SETTING UP A RESTRICTED AREA

Normally a Restricted Area is established to accomplish a planned maintenance task. However, the possibility exists for such an area to be established in an emergency.

A8.3.1 Planned Work

A Restricted Area must be set up when the planned work may lead to an exposure of petroleum as liquid or gas, involve the handling of leaded products or leaded sludge, or the introduction of sources of ignition. These hazards can arise in the following circumstances:

- a. Opening of plant and equipment for maintenance.
- b. Gas freeing of tanks.
- c. Tank entry.
- d. When any hot work is undertaken.
- e. When any leaded equipment, sludge or waste is handled or exposed.
- f. Excavation work (petroleum liquid or vapour may be at present in the surrounding ground).

A8.3.2 Emergency Situations

Examples are as follows:

- a. When any failure of equipment has occurred which could give rise to a source of ignition.
- b. When any unintended exposure of petroleum has occurred.
- c. When any unintended exposure of petroleum has occurred due to failure of equipment or fixed plant, whether or not in a Hazardous Area (e.g. leaks from cross base pipeline).

A8.4 SOURCES OF ESCAPE OF PETROLEUM

All means must be taken to avoid sources of release and to prevent accidental escape. Whenever possible, any escape of flammable liquid should be limited to the minimum quantity thus limiting the associated vapour, vapour spread, and risk. Examples of possible sources of release are:

- a. Mechanical failure of plant.
- b. Sample points.
- c. Pump and compressor seals.
- d. Interceptors and sumps.
- e. Flanges and tank vents.
- f. Filter separator and fuel monitor relief valves.
- g. Manhole and dip hatches.
- h. Drainage outlets.
- i. Pipeline vents.
- j. Mal-operation of plant processes.
- k. Mal-operation of draining and sampling facilities.
- l. Failure to remove product and arisings before opening up or working on plant and equipment.

It is therefore important to identify all possible sources of release as part of the hazard assessment at the planning stage of each job.

A8.5 CESSATION OF OPERATIONS

Many sources of release of vapour and spillage of liquid petroleum can occur at installations during normal operations. Typical sources of release include: release from vents on tank filling, filling of lorries and containers, and leaks from seals of pumps. For this reason all operations must be stopped in the Restricted Area and personnel removed from the area, to avoid the reintroduction of a petroleum risk to an area made safe. There is also the basic safety requirement that operations must cease to permit isolation, and to prevent accidental releases during maintenance.

Consideration must also be given to any contingent operation carried out by the Operating Authority adjacent to the Restricted Area, which could result in a release of gas into the area or introduction of a source of ignition. Such operations depending on circumstances, must be stopped, to enable the works activities to be conducted safely.

A8.6 SITE AND WEATHER CONDITIONS

These can play an important part in the safety of works and the safety consequences of works action. Consideration must be given to both site and weather conditions including the following:

- a. Type of petroleum product involved.
- b. Presence of valve and drainage pits, drains, ducts etc.
- c. Excavations and nature of ground surfaces and gradients.
- d. Proximity of public thoroughfares.
- e. Proximity and nature of adjacent operations.

In assessing weather conditions, account should be taken of wind direction and velocity, and the Authorised Person Petroleum should be prepared to react to changes in conditions. A change in wind direction may cause a change in the boundary of the Restricted Area.

Escaped petroleum gas, although heavier than air, may be carried upwards by wind currents, and in still air conditions, may linger. The latter presents a very serious risk at low levels. The potentially hazardous area that can be formed may therefore vary during the period of the planned work or the emergency situation, and must be monitored. Wind direction and strength should be determined by the use of a wind sock or flag located at high level, or in an exposed position free from shelter from the wind in any direction.

Wind direction must also be determined so that sources of air required for Breathing Apparatus and other equipment can be situated in an up wind location.

A8.7 EXTENT OF RESTRICTED AREA

A8.7.1 Method of Measurement

Normally the minimum extent of areas will be as for Hazardous Areas and be measured at a radius prescribed horizontally from the outer limits of the location when a hazardous atmosphere could occur and should be defined as follows:-

- a. Class I product installations -15 metres.

- b. Class II and III installations - 6 metres.
- c. Filling and Service Stations - 4.25 metres. (For hot work a minimum of 6 metres is required).

The minimum extent of the Restricted Area should be measured from the source of petroleum release or the edge of a potential spillage area.

A8.7.2 Extent of Areas for Gas Freeing

- a. The large volume of petroleum gas and air mixture released during gas freeing operations, particularly when highly volatile Class I product is involved, may result in gas concentrations above 1% of Lower Explosive Limit spreading beyond normal safety distances in certain weather conditions. This situation is unlikely when Class II petroleum is involved, but could occur in certain conditions such as when gas freeing above ground tanks in hot climates.
- b. In still air conditions, gas concentrations above 1% of Lower Explosive Limit are more likely to spread at low level beyond the normal Hazardous Area Safety distances. This situation is therefore the most hazardous for gas freeing operations.
- c. Gas concentrations must be carefully monitored at the boundaries of normal Restricted Areas, particularly at the commencement of gas freeing operations, and during the first 8 hours (see Section 6.2.6 and Table 6.1). Action must be taken before commencement of gas freeing operations to eliminate any possible sources of ignition as far as reasonable and practicable in the immediate areas surrounding the normal safety distance for the Hazardous Area, including downwind boundaries in conditions where there is a wind. Additional warning signs and markings must be readily available should extension of the Restricted Area be required.

A8.7.3 Conditions During Gas Freeing Operations

Maintenance, operation or any other type of work is not permitted in a Restricted Area whilst the gas freeing of Class I and II petroleum installations is in progress. The full requirements of the MOD Safety Rules and Procedures must be strictly adhered to.

A8.7.4 Removal of Sources of Emission of Gas

In circumstances where it is not practicable to meet the safety distances from the source of emission of gas described in Paragraph 7.1 of this appendix, it is often possible to move such a source to a safe distance. The following is an example:

The above ground vents on horizontal underground tanks or vents/pressure release valves on filter water separators and monitors can be adapted by attaching gas tight hoses or temporary pipelines to discharge at the required safety distance.

A8.8 ELECTRICAL STORMS

All work must be stopped and all personnel, tools, plant and equipment withdrawn from the area in the event of an electrical storm.

A8.9 HEALTH RISKS FROM PETROLEUM VAPOUR

The presence of petroleum vapour can present a health risk, as well as an ignition risk. The Authorised Person Petroleum must be aware of the potential risks of exposure of personnel to petroleum vapour and provide direction to the Person in Charge on the Permit to Work Petroleum Restricted Area. Particular care is required with Class I products due to the risks of exposure to highly volatile organic lead compounds, as well as the risk of the petroleum vapour.

A8.10 REFERENCE TO DEFENCE ESTATE ORGANISATION (WORKS)

In cases of doubt on the matters described in the setting up and assessment of Restricted Areas, the Authorising Engineer should be consulted. If a conclusion on the safe working method can not be reached, further advice can be sought from the Defence Estate Organisation (Works) Technical Authority.

Appendix 9 Gas freeing operations of tanks and confined spaces

A9.1 EXISTING VENTILATION SYSTEMS

Any system of ventilation provided as part of the permanent installation should be in operation. Such systems are usually associated with buried or mounded tank installations in access chambers and tunnels and valve chambers.

A9.2 USE OF STEAM FOR GAS FREEING

The use of steam for gas freeing fixed tanks is not permitted. Even if the steam nozzle is properly earthed, wet steam issuing from it can create hazardous electrostatic potentials which could give rise to incendive sparks. In addition the use of steam in larger tanks is not practicable because of the large condensing surface afforded by the tank shell. This creates a difficulty in raising the steam temperature in the tank space sufficiently for effective removal of petroleum gases.

A9.3 CATHODIC PROTECTION SYSTEMS

All cathodic protection systems must be disconnected 24 hours before the commencement of gas freeing.

A9.4 OPENING OF MANHOLES

Tank manholes are to be opened up to atmosphere and secured against accidental closure. Notices are to be fixed adjacent to the manholes warning against unauthorised closure.

A9.5 SELECTION OF GAS FREEING METHODS

Natural ventilation and the use of suitable windsails is a slow procedure. If time is at a premium, it is preferable to use mechanical means of ventilation i.e. air eductors or fans.

Windsails must not be made of plastic, or other materials likely to become electrostatically charged, and should be erected at an upwind manhole.

Air eductors should be sited at a downwind manhole. Any sleeves used to funnel the airflow must be manufactured of anti-static material.

Extractor fans are to be made of non-sparking material and may be driven by compressed air or an electric motor complying with Reference 19, and type approved for use in the Zone 1, Temperature Classification T4, Apparatus Group IIA. The associated spiral hose is to be electrically conductive (discharge

resistance <10 Ohm) and the steel spiral must be electrically connected to the fan. The fan rotating parts should be suitably protected to prevent them striking against any object or casing.

A9.6 VERTICAL ABOVE GROUND AND MOUNDED TANKS

The roof manholes of such tanks should be opened to the atmosphere and air eductors and extractor fans positioned on downwind manholes; windsails should be located at upwind manholes. Shell manholes should be kept closed until gas concentration readings taken at low levels through the manholes are consistently 4% of Lower Explosive Limit or below (by delaying the opening of shell manholes until the above point is reached, the possibility of high gas concentration at low level will be reduced).

In the unusual case of such tanks having only one roof manhole, a risk assessment must be prepared in order to develop a method statement for the specific gas freeing situation. For example, a possible method is the use of an air eductor at the upper manway, combined with partial opening of the upwind shell manholes when the eductor is operating, until a gas level of 4% of Lower Explosive Limit is achieved.

The reason shell manholes are not normally opened is to avoid heavier than air gas or vapour flowing out of the tank into the maintenance work area at what could be a high gas concentration. In such circumstances there are combustion and occupational exposure hazards to be countered. When a shell manhole is partially opened at the start of a gas freeing process the risk assessment is most likely to indicate the need for Respiratory Protective Equipment and Personal Protective Equipment for the personnel potentially at an exposure risk.

The 4% of the Lower Explosive Limit cited as appropriate for opening shell manholes is for guidance only. If 4% of the Lower Explosive Limit is likely to be experienced in the work area, and if a toxic product hazard applies, the requirements for Respiratory Protective Equipment, and Personal Protective Equipment must be defined.

A9.7 HORIZONTAL TANKS

Manhole covers and all other apertures should be opened up to permit maximum ventilation. Entry into a compartment of a multi-compartment tank should not be permitted until all other compartments have been emptied and freed of vapour.

A9.8 ENTRY INTO TANKS

The gas freeing process is to continue until entry is permitted under the MOD Safety Rules and Procedures. Internal fittings (i.e. floating suction and swing arms) are to be removed as soon as possible after tank entry (see Section 6.3.1).

A9.9 ELECTRICAL STORMS

Gas freeing operations must not start in an electrical storm. If an electrical storm starts after gas freeing has begun on Class I and Class II petroleum installations, operations must be stopped and all tank openings temporarily covered or closed. Consideration should be given to providing lightweight non-metallic covers (e.g. plywood) of the proper size to allow fast and easy covering of tank openings. Replacing the original steel manhole cover is a hazardous operation because of the possibility of an incendive spark.

Appendix 10 Petroleum storage tanks and facilities which are to be temporarily taken out of use or which are redundant

A10.1 INTRODUCTION

When there is a need to remove facilities on a temporary or permanent basis, there are a number of factors to be taken into account by the Operating Authority. These include the period of removal from service for temporary decommissioning, and the long term future of the site facilities for permanent decommissioning. The approach to decommissioning can vary according to local conditions and requirements. However, there are a number of fundamental safety considerations which apply generally and are raised in this appendix.

The safety risks of excavations at petroleum installations must be understood and the safe methods of work in accordance with the MOD Safety Rules and Procedures must be applied.

The general approach to tank decommissioning is initially to clean the facilities. There are certain developments, such as the use of hydrophobic foam which has the property to absorb hydrocarbons, which can be implemented in certain applications, without the need for the initial cleaning.

The decommissioning costs can vary with the out of service period required, the time period allowed for recommissioning, and the techniques available. The decommissioning of simple horizontal tank installations can be developed from the appendix, but reference to the Defence Estate Organisation (Works) Technical Authority is recommended for the decommissioning of vertical protected and unprotected installations.

A10.2 REDUNDANT FACILITIES - EXCAVATION WORK

A Restricted Area must be set up in accordance with the MOD Safety Rules and Procedures whenever any excavation work is undertaken at redundant petroleum installation which have held Class I or Class II products. Even after tanks and facilities have been gas freed, petroleum vapours may be present in the surrounding ground as a result of earlier leakages or spillage. Initial and intermediate combustible gas tests are to be taken during such work in accordance with Section 6, Table 6.1.

A10.3 TANK CLEANING AND GAS FREEING

Tanks should be emptied as far as possible by transferring the contents by pipeline to other tanks, barges or bulk carrying road vehicles. Any petroleum product which cannot be transferred in the above manner should be dispensed to suitable containers such as drums or jerricans. Containers should be removed from site to a safe place.

Whenever possible, tanks which have contained petroleum products but are redundant or are to be temporarily out of use, should be cleaned. This is irrespective of whether they are to be removed, retained in situ, and their fitness for further use. If hydrophobic foam is to be used, because of the hydrocarbon absorption properties, cleaning and gas freeing is not necessary.

The cleaning process is easier for epoxy lined aviation tanks than for unlined tanks which have contained leaded product. Many of the latter tanks are physically not capable of being entered, and entry is prohibited within the MOD Safety Rules and Procedures. In exceptional circumstances, when there is a perceived need for entry to such tanks, the Authorising Engineer Petroleum should consult the Defence Estate Organisation (Works) Technical Authority for guidance. The decommissioning of such tanks in situ, using hydrophobic foam affords the safest approach, and is recommended if the long term presence of the decommissioned tank on site is acceptable, and there are no tank floatation risks.

Tanks must be completely isolated and all pipelines disconnected, except the vent connections, before entry for cleaning and gas freeing operations is permitted. Tanks with common vent systems require special attention as these present a serious risk. The preferred approach is the elimination of common vents. Pipelines must be sealed.

Tanks which have contained Class I or II products should also be gas freed, i.e. the concentration of gas throughout the tank is to be 1% of Lower Explosive Limit or below. In the case of tanks which have contained Class III products, the cleaning may consist of the removal of all liquid product and loose sludge.

The date of cleaning and gas freeing should be painted on the manhole cover.

Tanks and installations which are temporarily out of use are subject to routine inspection and maintenance.

A10.4 TANKS TEMPORARILY OUT OF USE

Operating Authorities are encouraged to limit the time period for temporarily decommissioned tanks in general. In particular, tanks which have contained gasoline should be limited to a maximum temporarily decommissioned period of one year.

A10.4.1 Horizontal buried tanks

Tanks which have contained Class I petroleum must be made safe after cleaning by filling with water. The pH of the water should be checked, and if the water is acidic, it should be neutralised, or made slightly alkaline by adding caustic soda.

A notice stating "This tank is filled with water" should be fixed to the tank and the date it is taken out of service clearly marked on the tank. The tank must remain in the isolated condition as indicated in paragraph 3.

Tanks which have contained Class II or Class III products need not be water rilled unless there is a flotation risk. Tanks which are left cleaned but not water filled must not be considered as gas free for any subsequent works. A notice stating that the tank is empty and not gas free should be displayed.

Where access to the interior of a tank is restricted due to the absence or size of manholes, e.g. small underground kerbside pump installation tanks, extra care is required to remove as much product as possible.

The residue of Class I and II products can be removed from tanks by filling with fresh water through the normal filling connection. The petroleum floats to the surface and can be discharged through a hose fitted to the vent connection by overfilling the tank. The petroleum residue should be discharged into suitable containers and removed. The containers should be marked "PETROLEUM HIGHLY FLAMMABLE", and disposed of in accordance with Section 6.12. Any excess of water arising should be disposed of as hazardous waste.

The appropriate notices for tanks classed as lead contaminated must continue to be displayed.

A warning in writing should be given to the Operating Authority for the site, informing him of the presence of a tank which is empty and is not gas free and, if applicable, that it contains toxic deposits. An unlined tank which has contained gasoline, whether leaded or unleaded, contains toxic lead deposits.

A10.4.2 Above Ground Horizontal Tanks

These should be disconnected, cleaned, gas freed and securely closed, and notices and warnings posted and issued as paragraph A10.4.1.

A10.4.3 Vertical Above Ground Tanks

These tanks should be treated as paragraph A10.4.2. If there is a risk of flooding at the site, the bottom of the tank should be filled with sufficient fresh water to prevent floatation.

A10.4.4 Vertical Mounded Protected Tanks and Underground Storage Cells

These tanks should be treated as paragraph A10.4.2.

A10.4.5 Removal of Water Before Recommissioning of Tanks That have Been Temporarily Out of Use

The preferred method is the removal of the water by a licensed hazardous waste removal contractor.

There may be circumstances when it is necessary to consider the disposal of the water to the drainage system. In such circumstances, the interceptor must be sufficiently sized to handle the planned discharge rate, and maintained to give hydrocarbon discharges below a predetermined level. The National River Authority should be consulted at the job planning stage.

If the tank has previously been used for the storage of leaded gasoline products, additional special precautions must be taken before discharging water, via an oil interceptor. Lead tests on the water must be made in conjunction with the National River Authority to determine the level of contamination. The National River Authority will then decide whether the water can be discharged direct into the drainage system or is to be disposed of by other means.

Before a tank is filled again with product it should be cleaned internally. If the tank has been filled with water containing caustic soda, the tank should be thoroughly flushed out with clean water before being filled with product.

A10.4.6 Unguarded Temporarily Out of Use Tanks or Storage Cells

In the unlikely event of temporarily out of use tanks and storage cells being left unguarded, additional precautions will normally be necessary. Such additional precautions will depend on the type of installation, location, fences and walls. The Defence Estate Organisation (Works) Technical Authority will advise the appropriate course of action for the particular circumstances.

A10.5 REDUNDANT TANKS

A10.5.1 Buried Horizontal Tanks

The preferred option when tanks are redundant, is to remove them. In this way an environmentally sound permanent solution is achieved. During removal operations the surrounding soil should be tested for contamination and the Defence Estate Organisation (Works) Technical Authority on Water and Environmental Engineering be consulted.

A10.5.1.1 Redundant Left In Situ

If the Operating Authority decides that it is appropriate to leave the tanks in situ, then a decision on the method of decommissioning must be made taking into account technical and cost factors.

The broad approaches available are to concrete slurry fill, or to fill with hydrophobic foam. The ultimate use of the site may determine which approach is appropriate. If this is not the case, a cost evaluation of the two methods is recommended, for the installations under consideration. The concrete slurry approach requires the full tank cleaning and gas freeing routine prior to filling. The alternative approach does not require this. Concreting is very much a permanent solution, and any subsequent longer term requirement to remove such a tank is not an easy process. The use of hydrophobic foam would facilitate the removal or restoration to use of the tank, but there may be long term tank floatation risks in certain situations.

A record of the location, number of tanks, capacity, method of decommissioning and dimensions are to be kept in accordance with Section 12.

A10.5.1.2 Redundant—Removed From Site

The cost of hydrophobic foam filling versus cleaning and gas freeing depends on the facility size, and number of tanks. A cost evaluation is recommended for the two methods.

There are a number of safety issues which apply to the removal of tanks from site regardless of the method selected.

- a. Before removal of buried tanks in ground where there is a high water table, a method of working must be prepared to overcome the risk of the tank moving during excavation. It may not be practicable to foam fill tanks in such conditions due to the relatively low density of the foam. Where foam filling is unsuitable, the method of working can specify that tanks should be filled with water before removing the holding down straps.

- b. If concrete is to be broken up, the immediate vicinity (including the point of the tool) should be sprayed with water during the operation.
- c. When it is not possible to gas free a tank, the safest procedure is to use hydrophobic foam. This can only be applied when there is not a floatation risk.
- d. The action of tank cleaning and gas freeing, or foam filling should be completed before any excavation work commences. In this way petroleum risks from the tanks are minimised.
- e. Before a tank is lifted the water should be removed and the tank resealed. The water should be disposed of as paragraph A10.4.5.
- f. Recovered empty redundant tanks which are to be stored on the ground should be vented to prevent collapse in the event of a sudden drop of temperature. When the tank is only to be stored for a few days in this manner, one of the connections should be left open. When the tank is to be left for a longer period a 40 mm diameter return bend should be fitted to the connection to permit breathing.

A10.5.2 Above ground horizontal tanks

Redundant above ground horizontal tanks should, whenever possible, be removed from the site, particularly when the site is unguarded and the tanks can be approached by unauthorised persons.

A10.5.3 Disposal of redundant horizontal tanks

These tanks are normally transportable in one piece, and may, if structurally sound, be used elsewhere in MOD, or by third parties. Contracts are sometimes made which include removal of the tanks from their buried or above ground positions, including removal from site for own use or otherwise by the contractor. It is particularly important that any new user is warned in writing of the hazards involved with the tanks concerned.

All such tanks must have a warning notice painted on either end or both sides of the tank as follows:

"WARNING: DISUSED PETROLEUM TANK - NOT TO BE USED FOR DRINKING WATER OR POTABLE LIQUIDS".

In addition, all tanks which have been used for the storage of Class I or II products must have "NOT GAS FREE" painted under the above warnings.

Even though such tanks have been gas freed in accordance with this instruction, they cannot be guaranteed to remain gas free because traces of product can be trapped in the seams of the tanks or in scale or rust, which can produce concentrations of gas above 1% of Lower Explosive Limit, especially when transported and/or re-installed.

Tanks which have contained leaded gasoline at any time in the past may still give off toxic vapour. Notices as shown below are to be permanently fixed adjacent to all manholes and are not to be removed when the tanks are taken away intact from site by third parties:

"THIS TANK HAS CONTAINED LEADED GASOLINE. IT MUST NOT BE ENTERED"

When tanks are sold to third parties the contract documents must clearly state the applicable hazards. The third party must sign to accept full responsibility on such safety matters.

When tanks are to be disposed of, a competent hazardous waste disposal contractor should be employed. The contractor must be fully informed of the potential hazards which may include: petroleum product, toxic lead compounds and fuel system icing inhibitor. Disposal must be conducted in accordance with References 4 and 8.

The dismantling of horizontal tanks which have to be removed from site and are structurally unsound or uneconomic to repair is a potentially hazardous operation. Apart from the explosion risk there is the possible exposure to vapours, fumes and dusts, and only a competent contractor should be used for such work. It is usually preferable that flame cutting or air driven tools are operated from outside the tank during dismantling, and the use of inert gas or solid carbon dioxide (dry ice) inside such tanks during these operations should be considered. In the case of ex-leaded gasoline tanks, the tank plates should be disposed of by a competent and fully briefed hazardous waste disposal contractor. For tanks which have contained gasoline, and are to be scrapped, special requirements for the disposal of plates apply. The tank should be cut up, internal surfaces shot blasted to bare metal, and the steel returned to a mill for remelting.

A10.5.4 Disposal of Vertical Steel Tanks, Protected Vertical Mounded Tanks and Underground Storage Cells

The disposal of the above type of redundant tanks and storage cells is a complicated and expensive undertaking and the Defence Estate Organisation (Works) Technical Authority should be consulted on the matter.

A10.6 PIPELINES AND OTHER PETROLEUM FACILITIES TEMPORARILY OUT OF USE

The approach to temporary decommissioning of facilities depends on the probable period out of use, the product held, and the security of the site.

There are circumstances when it is more economic to retain AVTUR installations in a near operational condition, and provide security, maintenance and occasional fuel recirculation rather than temporary decommissioning. The advice of the Defence Estate Organisation (Works) Technical Authority should be sought when major AVTUR facilities may be required to be temporarily decommissioned.

When AVTUR installations are to be temporarily decommissioned, product must be drained from pipelines, fittings, filter separators, pumps etc, and all ends of pipelines, including connections to tanks, securely closed by blank flanges or screwed plugs. After draining, pumps must be isolated from connecting pipelines and filled with a corrosion inhibitor as recommended by the pump manufacturer. Cartridges must be removed from filter water separators.

In the unlikely event of pipelines and other petroleum facilities being left at a site which is unguarded and where they can be approached by unauthorised persons, the Defence Estate Organisation (Works) Technical Authority should be consulted.

All petroleum facilities which are temporarily out of use are subject to routine inspection.

A10.7 REDUNDANT PIPELINES AND OTHER PETROLEUM FACILITIES

Product must be drained from pipelines into suitable containers, and all valves and useful pipeline fittings removed to stores.

Above ground pipelines should normally be removed from site, and should be flushed with water, gas tested for cold work, then "cold cut" into convenient lengths. They should be drained and vented until they are safe for general handling.

Buried pipelines which are to be removed should be treated in the same manner as above. Removal is the preferred approach, and is significant if there is a possible risk of contamination of potable water extraction.

When the Operating Authority decides that pipelines are to be left in situ, they should first be flushed through with water to remove residual product. They should be left full of water, with the pipe ends securely closed with blank flanges or screwed plugs. Hydrophobic foam can be used in certain situations dependent of the pipeline size and access for foam injection.

The location of the redundant buried pipelines must be indicated by marker posts and recorded on a site plan.

All useful moveable equipment e.g. pumps, filters, meters, filter/water separators should be removed from the site to a store.

If redundant pipelines which have contained leaded product are required for use elsewhere, the transfer/contract documents must clearly state that they have contained leaded fuel and that they must not be used to convey drinking water or potable liquids. If the equipment is sold to a third party, he must sign on the MOD copy of the documents he accepts full responsibility on such safety matters.

The preferred approach in the disposal of such pipeline materials is as contaminated waste by a hazardous waste disposal contractor, fully briefed in the nature of the hazards of the materials.

Appendix 11 References and bibliography

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3. FACTORIES ACT 1961, Section 30.4.
4. HAZARDOUS WASTE REGULATIONS 1990
5. ENVIRONMENTAL PROTECTION ACT 1990
6. CONTROL OF POLLUTION ACT 1980
7. CONTROL OF POLLUTION (AMENDMENT ACT) 1989
8. ENVIRONMENTAL ACT (DUTY OF CARE) REGULATIONS 1991
9. SI 1994 No. 3246 HEALTH AND SAFETY
Control of Substances Hazardous to Health Regulations 1994
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The Personal Protective Equipment (EC Directive) (Amendment) Regulations 1994
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 22. INSTITUTE OF PETROLEUM MODEL CODE OF SAFE PRACTICE IN THE PETROLEUM INDUSTRY Part 18: Occupational Health, 1993.
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 27. DEFENCE WORKS FUNCTIONAL STANDARD 07
The Inspection, Maintenance and Testing of Equipment Installed at Petroleum Installations—Mechanical and Electrical
 28. DEFENCE WORKS FUNCTIONAL STANDARD
Design and Installation Guide for Specialist Works on Petroleum Installations—Electrical
 29. * DOE/PSA STANDARD SPECIFICATION M&E 114
Petroleum Tanks Preparation for Inspection and Maintenance Cleaning
 30. ASSOCIATED OCTEL BOOKLET
Leaded Gasoline Tank Cleaning
 31. * PSA STANDARD SPECIFICATION (M&E) 110
Maintenance, Repair and Testing of Garage-type Metering Dispense Pumps and Tank Fittings
 32. HSE EH40
Occupational exposure limits
- * DOE/PSA Standards adopted by the MOD, which will be updated by Defence Estate Organisation (Works).

Appendix 12 Definitions

A12.1 Authorising Engineer Petroleum

A suitably experienced chartered mechanical engineer experienced in petroleum handling systems, employed or commissioned by the Works Services Manager or MOD, and appointed by the Commanding Officer, Head of Establishment or Officer in Charge to ensure safety of petroleum work for the base.

A12.2 Authorised Person Petroleum

A person employed by, or commissioned by the Works Services Manager or MOD, and appointed for the purpose of implementing the MOD Safety Rules and Procedures by the Commanding Officer/Head of Establishment/Officer in Charge. An example of the format of the certificate of appointment is at Appendix 1.

A12.3 Breathing Apparatus (BA)

Refer to Respiratory Protective Equipment (Definition A12.36) and Personal Protective Equipment Types (Definition A12.31)

A12.4 Classes of Petroleum Products

These following are in accordance with the Institute of Petroleum definitions:

Class I: Liquids which have a flash point below 21 degrees C.

Class II: Liquids which have a flash point from 21 to 55 degrees C inclusive.

Class III: Liquids which have a flash point above 55 degrees C, up to and including 100 degrees C.

Unclassified: Liquids which have a flash point above 100 degrees C.

The above classifications are based on petroleum products handled and stored at temperatures below their flash points. For conditions or countries where ambient temperatures are high enough for the handling temperature of Class II or Class III petroleum product to be above the respective flash point, the product must be treated as Class I (Examples of the classification of petroleum products used on the MOD Estate are shown in Appendix 2). Where petroleum products of different classes are mixed, the mixture is classified as the liquid having the lower flash point, unless flash point determination tests show otherwise.

A12.5 Multiple Gas Indicator

An indicator designed to measure the concentration of Hydrocarbons, Oxygen, and other gases depending on the requirement and the type of sensors fitted.

A12.6 Confined Space

Any tank, chamber, pit, pipe, excavation, tunnel, unventilated room or enclosure in which the atmosphere is likely to be hazardous by virtue of a build up of heavier than air vapours, oxygen enrichment or deficiency, or any enclosure where a dangerous accumulation of gases or vapours can build up because of restricted air circulation. Throughout the MOD Safety Rules and Procedures for Works on Petroleum Installations, when reference is made to tanks it also includes any other confined spaces as defined above unless otherwise stated.

A12.7 Cold Work

Cold work includes the use of tools for erection, dismantling and cleaning, which are not liable to produce incensive sparks, and work such as drilling, tapping and cutting carried out in such a way as to limit the heat produced and keep the temperature of the tools and work below 100 degrees C.

A12.8 Combustible

Combustible refers to any substance solid, liquid or gas which will burn with the application of heat.

A12.9 Dangerous Fumes

Fumes in a concentration, or mixture with air, of an obnoxious, harmful or dangerous nature, arising from gases or vapours generated from products and materials, from welding and the use of heat-generating tools, application of protective coating etc., particularly in unventilated spaces.

A12.10 Dangerous Occurrence

An incident which may give or has given rise to injury to person or damage to plant and/or equipment.

A12.11 Flammable (Synonymous with Inflammable)

Refers to any substance, solid, liquid, gas or vapour, which in the presence of air, is easily ignited. The addition of the prefix 'non' shall indicate that the substances are not readily ignited, but does not necessarily indicate that they are non-combustible.

A12.12 Filling and Service Stations (Kerbside Pump Installations)

Installations for the receipt, storage and issue of petroleum products directly into the fuel tanks of vehicles for the sole use of those vehicles, and for the occasional filling of portable containers.

A12.13 Flash Point

The lowest temperature at which the liquid gives off sufficient flammable vapour to form a mixture with air that can be ignited momentarily in prescribed laboratory apparatus.

A12.14 Gas

A term used in accordance with the practice of the Petroleum Industry and MOD, for example, in gas detection. The term is also used to describe petroleum vapours, and the residual vapour in tanks which must be removed before tank entry.

A12.15 Gas Concentration

A concentration of gas expressed as a percentage of the Lower Explosive Limit.

A12.16 Gas-Free

An environment is said to be gas free when the following conditions are all met:

- a. A gas test shows that the concentration of gas is 1% or below of the Lower Explosive Limit
- b. When it is free from all fuel and residues
- c. When it is free from vapour drift from any source.

A12.17 Hazardous Area

Any area surrounding a location where the emission of petroleum could occur as a liquid or gas. The extent of the area is specified by the Operating Authority and is indicated by notices.

A12.18 Hot Work

This includes welding, the use of any flame or electric arc, and the use of any equipment likely to cause heat, flame or incensive sparks including non certified electrical equipment. It also includes caulking, chipping, drilling, rivetting and any other heat-producing operation, unless it is carried out in such a way as to keep the temperature of the tools and the work below 100 degrees C, whilst also preventing the creation of incensive sparks.

A12.19 Incensive Spark

A spark of sufficient temperature and energy to ignite a flammable gas.

A12.20 Lead

A toxic alkyl compound (tetraethyl lead or tetra methyl lead) which is present in gasoline.

A12.21 Lead-Free

- a. Any tank, vessel or equipment which has at no time contained gasoline. Note that so called unleaded gasoline contains lead, and tanks which contain that product can therefore not be classed as lead free.
- b. Any tank, vessel or equipment which has contained leaded fuel and the whole of which has been blast cleaned and internally epoxy coated.

A12.22 Lower Explosive Limit (Synonymous with Lower Flammable Limit)

The percentage by volume of gas in a mixture of gas and air below which no explosion will take place.

A12.23 Notification List

The Authorised Person Petroleum presents this list to the Operating Authority for permission to raise Permit to Work Petroleum Hazardous Area.

A12.24 Operating Authority

The term is used in two related contexts, one use is to represent the line manager (either RN, RAF, Army, USF or civilian body) having overall control of the operation of a petroleum installation, filling and service station or plant storage facility. In this context the Operating Authority is the officer with delegated authority for the operation of the petroleum installation. The alternative use of the term is to describe the overall Service Operating Authority which defines the rules for handling petroleum at Service installations.

A12.25 Operating Authority—Authorisation for Restricted Area Permits to be raised

This is a form which enables the Authorised Person Petroleum to gain permission from the Operating Authority to set up and raise permits for a Restricted Area. The Operating Authority may use a copy of the form for establishment wide communication.

A12.26 Oxygen Meter

Indicator for determining percentage oxygen content by volume of the atmosphere.

A12.27 Packed Petroleum Oil and Lubricants

Petroleum products in portable containers such as drums, or cans.

A12.28 Permit to Work Petroleum

- a. Documents issued by an Authorised Person Petroleum setting out the conditions under which construction, modification, repairs, maintenance work, can be carried out in a Hazardous or Restricted Area.
- b. For work in hazardous areas which have not been declared Restricted Areas, a Hazardous Area Permit is used.
- c. For works in Restricted Areas, a Restricted Area Permit is used. This document is also used to record the results of combustible gas concentration and oxygen percentage tests.

A12.29 Person in Charge

The person who has direct responsibility on site for a specified task of construction, modification, repair or maintenance, and is so named on the Permit to Work Petroleum

A12.30 Personal Protective Equipment

Overalls, headgear, eye protection, footwear, gloves, and other equipment intended for the protection of personnel against contamination by petroleum products.

A12.31 Personal Protective Equipment Types (See also Definition A12.36—Respiratory Protective Equipment)

Technically, Personal Protective Equipment includes the equipment which prevents exposure of the body to harmful substances, and also the Respiratory Protective Equipment which assures the quality of breathable air. For the purposes of the MOD Safety Rules and Procedures, the latter is dealt with under the Respiratory Protective Equipment definition.

The materials of any suit, and associated Personal Protective Equipment must be certified by the supplier as fit to afford protection from exposure to the petroleum products or other harmful substances which are likely to be encountered. The suit, gloves and boots used in potentially explosive atmospheres must also be antistatic.

a. Grade 1A

A full suit with integral pressure hood all of light coloured neoprene, or with an integral helmet of glass fibre resin laminate, for connection to a continuous breathable air supply by PVC hose. The gloves are of light coloured PVC and are

cotton lined. The Grade 1A Personal Protective Equipment is completed by boots of neoprene or natural rubber, which are thigh or knee length, or are integral with the suit.

b. Grade 1B

Comprises overalls, complete with a separate air blouse, all of light coloured neoprene, connected to a continuous breathable air supply by PVC hose. Gloves and boots are as for Grade 1A.

c. Grade 1C

Comprises overalls with hood, all of light coloured neoprene, for use with air line mask fed from air bottles. Gloves and boots are as for Grade 1A.

d. Grade II

Overalls with a hood, all of light coloured cotton or equal. Gloves and boots are as for Grade 1A.

A12.32 Petrol, Oil and Lubricants [POL]

A general term indicating a broad range of petroleum products including petrol, oil and lubricants. The term is widely used on the MOD Estate but is in the process of being phased out and replaced by the term Fuel and Lubricants. The term Petroleum is used throughout this document, for example, Authorised Person Petroleum, and Petroleum Installation, to emphasise the source of the hazard to maintenance operations.

A12.33 Petroleum Installation

Any facility on the MOD Estate where petroleum is stored handled and distributed in bulk liquid form as distinct from packed stock form. The definition applies to installations for all classes of petroleum product.

A12.34 Restricted Area

A temporarily defined area, normally but not necessarily in a Hazardous Area, in which, owing to the nature of the work to be undertaken, a release of petroleum product or liquid is possible thus giving rise to an increased risk of:

- a. Fire.
- b. Explosion.
- c. Asphyxiation.
- d. Poisoning from toxic sludge, fumes, gas or dust.

A12.35 Respirator

A device in which inhaled air passes through a filter medium to remove solid or gaseous contaminants.

A12.36 Respiratory Protective Equipment (See also Definition A12.31—Personal Protective Equipment Types)

All Respiratory Protective Equipment must have Health and Safety Executive approval and/or be CE marked. Existing equipment can be in accordance with Reference 11, but all new equipment must be in accordance with Reference 10.

a. Grade 1A

A full suit with Health and Safety executive approval and/or CE marked, with integral hood or helmet connected to a supply of breathable air fed continuously to the wearer by a compressor via PVC hose.

b. Grade 1 B

Air blouse with Health and Safety Executive approval and/or CE marked, with air supplied as for Grade 1A above.

c. Grade 1C

A full face piece positive pressure air line mask with Health and Safety Executive approval and/or CE marked, with air supplied by either compressed air in bottles carried by the wearer, or from bottles mounted on a hose cradle with a PVC hose supply, or an external air supply.

d. Grade II

A full face piece air line mask with Health and Safety Executive approval and/or CE marked, with air supplied by an attached open ended PVC hose not less than 20 mm bore and not more than 9 m long.

e. Grade III

A full face mask with canister containing activated charcoal, with Health and safety Executive approval and/or CE marked, and in accordance with References 10, 11 and 17.

A12.37 Rescue Line

A line used in conjunction with a safety rescue harness.

A12.38 Response Testing Apparatus

Apparatus designed to permit the accuracy of Multiple Gas Indicators to be checked, see Appendix 6.

A12.39 Resuscitation Apparatus

A portable apparatus for supplying oxygen to assist resuscitation. For use only by specifically trained personnel.

A12.40 Safety Rescue Harness

A harness worn when working in a tank or confined space to facilitate the removal of the wearer in an emergency.

A12.41 Senior Authorising Engineer Petroleum

A suitably experienced chartered engineer with qualifications in an appropriate specialism, employed or commissioned by the Works Services Manager or MOD to co-ordinate the activities of a group or team of Authorising Engineers

A12.42 Spillage

Accidental outflow of flammable material or substance.

A12.43 Swing Arm

A hinged pipe jointed within the wall of a storage tank and connected to an outlet tank valve and line externally. The internal height of the arm is adjustable by cable to an external winch so that petroleum product may be withdrawn from a tank at any desired height. (Mainly used on MOD (Navy) Class III product tanks).

A12.44 Tank Emptying and Drainage

The removal as far as is practicable of the liquid contents of a tank by use of tank outlets and drains.

A12.45 Tank Cleaning

The process of removing all vestiges of sludge, sediment, scale, rust and such like material from all internal surfaces of a tank and installed components.

A12.46 Toxic

Material or substance harmful to health by virtue of inhalation, ingestion or absorption.

A12.47 Work

The exercise of skills directed towards the implementation of the task(s) described on a Permit to Work Petroleum.

A12.48 Worksite

The Work Site is an area of the actual work being carried out and such adjacent areas as are being used to enable the work to progress.

The Restricted Area of the Work Site is the whole area classified and defined as Restricted in accordance with Paragraph A12.34.



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